

James *AN* *Kenlock*
1792

INTRODUCTION
TO
MERCHANDISE.

CONTAINING

A Complete System of ARITH- METIC.	An Account of the TRADE of GREAT BRITAIN, and the LAWS and PRACTICES relating to Sale, Factorage, Insurance, Shipping, &c.
A System of ALGEBRA.	
Forms and Manner of Transacting BILLS of EXCHANGE.	
BOOK-KEEPING in Various Forms.	

THE SECOND EDITION,
CORRECTED AND REVISED.

By ROBERT HAMILTON, LL. D.

PROFESSOR OF PHILOSOPHY IN THE MARISCHAL
COLLEGE, ABERDEEN.

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INTRODUCTION

MERCHANTS

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A Complete System of Arithmetic
A System of Algebra
The Principles of Trigonometry
The Principles of Statics
The Principles of Dynamics



BY ROBERT HAMILTON, LL.D.

PROFESSOR OF THE GEOMETRY IN THE MARSHALL
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THE following Treatise on several branches of Mercantile Education, was first published some years ago in two volumes, when the Author had the superintendence of an Academy where these subjects were taught. A new edition being demanded, he has carefully revised the whole; and by abridging some parts that would admit of it, has now comprehended the book in one volume. Every material article is retained, and a few new ones inserted. The answers to the questions, which were omitted in the former edition, are now printed on separate sheets, that teachers may use them or not, as they find convenient.

ERRATA.

PAGE	line	30	for	multiplier	read	multiplicand
		31		multiplicand		multiplier
29	15			lower		higher
	16			higher		lower
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	4	foot		136		135
63	25			834		8344
67	7	foot		L.87 : 12 : 6		L.86 : 12 : 6
104	27			6		12
	28			d.3.000		d.6.000
228	15			current exchange,		current, exchange
368	foot			Note MM		Note NN
369	4	foot		19 : 15		10 : 15
369	6			Note DD		Note EE
370	3			227 : 13 : 9		227 : 3 : 9
372	5			2000		200
379	4			759		750
391	8	foot		282 : 13		282 : 13 : 4
403	6			133 : 7 : 6		133 : 17 : 6
440	Add to P. Mof's account, Dec. 31. To Profit and Loss, L.7 : 2 : 4, and the sum.					

An article omitted in Journal B, 7th Dec. is inserted page 411.

Note to the BOOKBINDER.

By a mistake in marking the sheets 3L is wanting, and 3 M immediately follows 3 K.

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Buckner
May 1799

AN
INTRODUCTION
TO
MERCHANDIZE.

PART I. ARITHMETIC.

CHAP. I.
NOTATION AND NUMERATION.

§ 1. **A**RITHMETIC is the science which treats of number. The theory of arithmetic explains the properties of numbers; practical arithmetic applies them to the performance of calculations. The first elements of arithmetic are acquired during our infancy. The idea of number is suggested by observing the members of our own body, and every object around us. By viewing our hands, we acquire the idea of two; by examining our fingers, we advance to five and ten; and, by further observation, to higher numbers. The idea of one is suggested by every single object; that of two, by placing one object near another; three, four, and every higher number, by adding one continually to the former collection. As we thus advance from lower numbers to higher, we soon perceive that there is no limit to this increasing operation; and that, whatever number of objects be collected together, more may be added, at least in imagination; so that we can never reach the highest possible number, nor approach near it. The idea of numbers, which is first acquired by the observation of sensible objects, is afterwards extended to measures of space and time, affections of the mind, and other immaterial qualities.

§ 2. As our senses are limited in the number of objects which can be perceived distinctly at one time; so our ideas of higher numbers are formed with difficulty, and attended with confusion; and every step we advance, the difficulty becomes greater. This has suggested the art of systematic arrangement. A certain number of

A units

units are conceived to form a class of the lowest kind, and a like number of these classes form one of a higher kind; and superior ranks of classes are formed in the same manner, as far as occasion requires. This regular method renders our ideas exact, and our progress easy. If a boy should arrange an hundred stones in one row, he would be tired before he could reckon them; but if he place them in ten rows of ten stones each, he will reckon an hundred with ease; and if he collect ten such parcels, he will reckon a thousand. In this case ten is the lowest class, an hundred is a class of the second rank, and a thousand is a class of the third rank.

The number of units which constitute a class, or of classes of a lower order which constitute one of a higher, is called *the root of the arithmetical scale*. There does not seem to be any number naturally adapted for this purpose to the exclusion of others; however, as ten has been universally used by all nations who have cultivated this science, it is probably the most convenient for general use. Other scales, however, may be assumed, perhaps on some occasions, with superior advantage; and the principles of arithmetic will appear in their full extent, if the student can adapt them to any scale whatever. Thus, if eight were the root of the scale, 6 times 3 would be two classes and two units, or 22; and if twelve were the root, 5 times 9 would be three classes and nine units, or 39.

§ 3. As higher numbers are somewhat difficult to apprehend, we naturally fall on contrivances to fix them in our minds, and render them familiar. Some perhaps will be conscious that they conceive the numbers from one to an hundred to be placed in a line bent in ten different directions, having ten numbers placed on each division, and that ten such lines placed by each other contain all the numbers to a thousand: But, notwithstanding this or any like expedient, our ideas of high numbers are still imperfect, and generally fall short of the reality; and, though we can perform any computation with exactness, the answer we obtain is often incompletely apprehended.

It may not be amiss to illustrate, by a few examples, the extent of numbers which are frequently named, without being attended to. If a person employed in telling money reckon an hundred pieces in a minute, and continue to work ten hours each day, he will take seventeen days to reckon a million; a thousand men would take forty-five years to reckon a billion. If we suppose the whole earth to be as populous as Britain, and to have been so from the creation, and that the whole race of mankind had constantly spent their time in telling from a heap consisting of a quadrillion of pieces, they would hardly have yet reckoned the thousandth part of that quantity.

§ 4. Before we proceed to explain the operations in arithmetic, it is necessary that the learner be acquainted with the method of expressing numbers by proper characters, which is called NOTATION, and reckoning their value, which is called NUMERATION. Various

con-

CHAP. I. NOTATION AND NUMERATION.

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contrivances have been used for this purpose, and mankind have advanced in this, as in other arts, from simpler to more intricate methods, as their circumstances required and their experience suggested. The first was probably to mark as many lines or dots in a row as there were units in the number they intended to represent; and this practice is still used by the illiterate, and improved by dividing these marks into parcels of five or ten, that they may be reckoned with more ease. The tediousness of this method suggested another, wherein each number was represented by a character peculiar to it, as is done in the divisions of the 119th psalm, and of Homer's poems, the characters used being the letters of the alphabet in their order.

The first of these methods was tiresome from the number of marks; and the second impracticable, when the number was large, from the multitude of characters required. Another more adapted for use was formed by combining them together, and assuming different characters to represent one, ten, an hundred, and each rank of classes; but repeating these characters, to show how many units, tens, or higher classes were signified. The Greeks used the initial letters of the names of the numbers in their language, I for one, Δ for ten, H for an hundred, x for a thousand, M for ten thousand; and as they found it tiresome to repeat the same character eight or nine times, they introduced II for five, and placed the other numeral letters within II, which signified that they were to be reckoned five times, and thus they never had occasion to repeat the same character oftener than four times.

§ 5. The Romans followed a like method; and besides characters for each rank of classes, they introduced others for five, fifty, and five hundred. Their numeral letters and values are the following:

I V X L C D M

One, five, ten, fifty, one hundred, five hundred, one thousand.

Any number may be represented by repeating and combining these letters according to the following rules.

1st, When the same letter is repeated twice, or oftener, its value is represented as often. Thus II signifies two, XXX thirty, CC two hundred.

2d, When a numeral letter of lesser value is placed after one of greater, their values are added; thus XI signifies eleven, LXV sixty-five, MDCXXVIII one thousand six hundred and twenty-eight.

3d, When a numeral letter of lesser value is placed before one of greater, the value of the lesser is taken from that of the greater; thus IV signifies four, XL forty, XC ninety, CD four hundred.

Sometimes IO is used instead of D for 500, and the value is increased ten times by annexing O to the right hand.

Thus	IO signifies	500 also	CIO is used for	1000
	IOO	5000	CCIOO	for 10000
	IOOO	50000	CCCIOOO	for 100000

Sometimes thousands are represented by drawing a line over the

top of the numeral, $\overline{V}$ being used for five thousand, $\overline{L}$ for fifty thousand, $\overline{CC}$ two hundred thousand.

In expressing dates, the centuries of years are sometimes marked by numeral letters, using *J* for a thousand, instead of *M*, in the following manner; *Jxviiic and seventy-five*, for one thousand seven hundred and seventy-five.

§ 6. Though the repetition of the same character was less frequent in the Roman notation, there remained enough to prove inconvenient; and we find other methods used by the Greeks and Hebrews, which bear a greater resemblance to our modern figures. In these, the numbers under ten were represented by nine different characters. Ten, twenty, and other collections of tens, as far as ninety, were represented by nine others; one hundred, two hundred, and so on to nine hundred, by nine others; in all twenty-seven characters, which were mostly supplied by the letters of their alphabets. Thus any number under a thousand may be represented by three letters; the first points out how many hundreds it consists of, the second how many tens besides the hundreds, and the third how many units besides tens. If a point be placed under any of these characters, its value is increased a thousand times, by which means any number under a million may be represented*. Thus the ancients approached to the use of figures, but did not reach it completely. Their method required nine characters for each rank of classes; and consequently could not carry on the arithmetical scale indefinitely without an indefinite number of characters.

The most perfect kind of notation is performed by a few characters, which, with proper distinctions, either represent so many units, or an equal number of tens, of hundreds, or any higher class; and, in order to determine in which of these senses each figure is to be understood, an additional character or index has sometimes been superscribed. But the expedient of determining their value by their place, is both easier and more extensive, and has superseded the use of every other method. It is said to have been invented in India, but was introduced into Europe by the Moors, who brought it, together with our modern figures, from Arabia.

§ 7. All numbers are represented by the ten following characters.

1	2	3	4	5	6	7	8	9	0
One,	two,	three,	four,	five,	six,	seven,	eight,	nine,	cypher.

The nine first are called significant figures, or digits, and sometimes represent units, sometimes tens, hundreds, or higher classes. When placed singly, they denote the simple numbers subjoined to the characters. When several are placed together, the first or right-hand figure only is to be taken for its simple value; the second signifies so many tens, the third so many hundreds, and the others so many higher classes, according to the order they stand in. And as it

* The Hebrews express the number fifteen in a peculiar manner. It should be $\overline{xv}$, which letters signify ten and five; but as these letters also compose the name of God, they deem it unlawful to apply them to profane use, and instead of them use $\overline{xvi}$, the letters which signify nine and six.

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3

it may sometimes be required to express a number consisting of tens, hundreds, or higher classes, without any units or classes of a lower rank annexed; and as this can only be done by figures standing in the second, third, or higher place, while there are none to fill up the lower ones; therefore an additional character or cypher (0) is necessary, which has no signification when placed by itself, but which serves to supply the vacant places, and bring the figures to their proper station.

The following table shows the names and divisions of the classes.

8.	4	3	7.	9	8	2.	5	6	4.	7	3	8.	9	7	2.	6	4	5
TRILLIONS.	Hundred thousand of billions	Ten thousand of billions	Thousand billions	Hundred billions	Ten billions	BILLIONS.	Hundred thousand of millions	Ten thousand of millions	Thousand millions	Hundred millions	Ten millions	MILLIONS.	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Units

The first six figures from the right-hand are called the unit period; the next six the million period; after which the trillion, quadrillion, quintillion, sextillion, septillion, octillion, and nonillion periods follow in their order.

It is proper to divide any number, before we reckon it, into periods and half periods, by different marks. We then begin at the left hand, and read the figures in their order, with the names of their places, from the table. In writing any number, we must be careful to mark the figures in their proper places, and supply the vacant places with cyphers. The following examples of literal notation may be transferred into numeral, and those of numeral into literal, or expressed in words, for the learner's improvement.

III	CLIV	1763	949	2308
MMMM	XLIX	1489	1865	740
XII	MXCIX	1286	1743	2499
XIV	MCCXLIX	1705	96	10785
LXVI	CDLIV	3799	1386	100273
XCVII	MCMXI	8372	777	569

§ 8. As there are no possible ways of changing numbers, except by enlarging or diminishing them according to some given rule, it follows, that the whole art of arithmetic is comprehended in two operations, ADDITION and SUBTRACTION. However, as it is frequently required to add several equal numbers together, or to subtract several equal ones from a greater, till it be exhausted, proper methods have been invented for facilitating the operation in these cases,

cases, and distinguished by the names of **MULTIPLICATION** and **DIVISION**.

As the idea of number is acquired by observing several objects collected, so is that of fractions by observing an object divided into several parts. As we sometimes meet with objects broken into two, three, or more parts, we may consider any or all of these modes of division promiscuously, which is done in the doctrine of vulgar fractions. However, as the practice of collecting units into classes of tens has prevailed universally, it has been found convenient to follow a like method in the consideration of fractions, by dividing each unit into ten equal parts, and each of these into ten smaller parts; and so on. Numbers, divided in this manner, are called **Decimal Fractions**.

§9. Arithmetic is still susceptible of further improvement: The operations which it teaches were at first suggested by their use in the ordinary affairs of life; but men of a philosophical turn have considered the theory which these operations depend on, as a curious branch of science founded on self-evident principles, capable of strict demonstration, unfolding a great variety of matter, and connected with other mathematical sciences; and have cultivated it from the satisfaction they found in promoting speculative knowledge. The common form of arithmetic is not adapted for investigations of this kind. In complex calculations, new numbers are obtained at each step; and the original ones, by the combination of which they were obtained, disappear, and are forgotten: also the particular numbers proposed in each case, being intermixed with the general principles of calculation, obscure these principles in some degree, by confining our attention to the single case before us. These inconveniences are removed by the use of proper symbols; some of which represent the various combinations and connections of numbers, and thereby place the whole process before our eyes in one concise point of view; others represent the numbers themselves, and, by abstracting from particular cases, fix our minds on general principles. The doctrine of these symbols forms the science of **ALGEBRA**; the principles of which we shall explain, so far as is necessary to complete our knowledge of the theory of arithmetic.

CHAP. II.

A D D I T I O N.

§10. **A**DDITION is that operation by which we find the amount of two or more numbers. The method of doing this in simple cases is obvious as soon as the meaning of number is known, and admits of no illustration. A young learner will begin at one of the numbers and reckon up as many units separately as there are in the other, and practice will soon enable him to do it at once.

It is impossible, strictly speaking, to add more than two numbers at one time. We must begin by finding the sum of the first and second; then we add the third to that sum; and so on. However, as the several sums obtained are easily retained in one's memory, it is neither necessary nor usual to mark them down. When the numbers consist of more figures than one, we add the units together, the tens together; and so on. But if the sum of the units exceed ten, or contain ten several times, we add the number of tens it contains to the next column, and only set down the number of units that are over. In like manner, we carry the tens of every column to the next higher. And the reason of this is obvious, from the value of the places; since an unit, in any higher place, signifies the same thing as ten in the place immediately lower.

Rule. Write the numbers distinctly, units under units, tens under tens, and so on; and draw a line under the lowest number. Then reckon the amount of the right-hand column; and if it be under ten, mark it at the foot of the column. If it exceed ten, consider how many tens it contains, and carry as many units to the next column, and mark the excess of the sum above the tens at the foot of the column. In like manner, carry the tens of each column to the next, and mark down the full sum of the left-hand column.

Examples:

346863	9678432	5678964	557896	36928
876734	6934796	7967343	102357	58871
123467	3243690	1254710	579982	36984
314213	418071	6786786	258989	72578
712316	72761	434376	837256	97231
438987	61762	752698	919489	64823
279654	92676	1354968	763785	75462

3092234
24433

§ 11. As it is of great consequence in business to perform addition readily and exactly, the learner ought to practise it till it become quite familiar. We shall add a few directions to facilitate his progress.

1st, If the learner can readily add any two digits, he will soon add a digit to a higher number with equal ease. It is only to add the unit place of that number to the digit; and if it exceed ten, it raises the amount accordingly. Thus, because eight and six is fourteen, forty-eight and six is fifty-four.

2d, It is proper to mark under the sums of each column, in a small hand, the figure that is carried to the next column. This prevents the trouble of going over the whole operation again, in case of interruption or mistake. If we want to keep the account clean, we mark the sum and the figures we carry on a separate paper, and after revising them, transcribe the sum only.

3d, After

3d, After some practice we ought to acquire the habit of adding two or more figures at one glance. This is particularly useful when two figures which amount to ten, as 6 and 4, or 7 and 3, stand together in the column.

§ 12. Every operation in arithmetic ought to be revised to prevent mistakes; and as one is apt to fall into the same mistake if he revise it in the same manner he performed it, it is proper either to alter the order, or to trace back the steps by which the operation advanced, which will lead us at last to the number we began with. Every operation for proving accompts may be referred to one or other of these methods.

Addition may be proven by any of the following methods: 1st, Repeat the operation, beginning at the top of the column, if you began at the foot when you wrought it.

2d, Divide the accompt into several parts; add these separately, and then add the sums together. If their amount correspond with the sum of the accompt, when added at once, it may be presumed right. This method is particularly proper when you want to know the sums of the parts, as well as that of the whole.

3d, Subtract the numbers successively from the sum; if the accompt be right, you will exhaust it exactly, and find no remainder.

§ 13. When the given number consists of articles of different value, as pounds, shillings, and pence, or the like, which are called different denominations, the operations in arithmetic must be regulated by the value of the articles. The following tables may be sufficient at present for that purpose.

I. Sterling Money.

4 Farthings=1 penny, marked d.
12 Pence=1 shilling, s.
20 Shillings=1 pound, L.
Also, 6s. 8d.=1 noble
10s.=1 angel
13s. 4d. or two thirds of a pound=1 merk.

II. Averdupois Weight.

16 Drams=1 ounce, oz.
16 Ounces=1 pound, lb.
28 Pound=1 quarter, qr.
4 Quarter=1 hun. weight, C.
20 Hund. Weight=1 ton, T.

Scots money is divided in the same manner as Sterling, and has one twelfth of its value. A pound Scots is equal to 1s. 8d. Sterling, a shilling Scots to a penny Sterling, and a penny Scots to a twelfth part of a penny Sterling: a mark Scots is two thirds of a pound Scots, or $13\frac{1}{3}$ d. Sterling.

III. Troy Weight.

20 Mites=1 grain, gr.
24 Grains=1 pennyweight, dwt.
20 Pennyweights=1 ounce, oz.
12 Ounces=1 pound, lb.

IV. Apothecaries Weight.

20 Grains=1 scruple, ℥
3 Scruples=1 dram, ʒ
8 Drams=1 ounce, ʒ
12 Ounces=1 pound, lb

V. *Engliſh Dry Measure.*

- 2 Pints=1 quart
 4 Quarts=1 gallon
 2 Gallons=1 peck
 4 Pecks=1 buſhel
 8 Buſhels=1 quarter.

VII. *Engliſh Land Measure.*

- 30 $\frac{1}{4}$ Square yards=1 pole or perch
 40 Poles=1 rood
 4 Roods=1 acre

IX. *Long Measure.*

- 12 Inches=1 foot
 3 Feet=1 yard
 5 $\frac{1}{2}$ Yards=1 pole
 40 Poles=1 furlong
 8 Furlongs=1 mile
 3 Miles=1 league.

VI. *Scots Dry Measure.*

- 4 Lippies=1 peck
 4 Pecks=1 firlo
 4 Firloths=1 boll
 16 Bolls=1 chalder.

VIII. *Scots Land Measure.*

- 36 Square ells=1 fall
 40 Falls=1 rood
 4 Roods=1 acre.

X. *Time.*

- 60 Seconds=1 minute
 60 Minutes=1 hour
 24 Hours=1 day
 7 Days=1 week
 365 Days=1 year
 52 Weeks and 1 day=1 year.

The length of the year, according to the Julian ſtyle, is 365 days and 6 hours, and is regulated by allowing an additional day to every fourth year, or leap-year. The number of days in each month is as follows:

January 31, February 28 in common years, and 29 in leap-years, March 31, April 30, May 31, June 30, July 31, Auguſt 31, September 30, October 31, November 30, December 31.

§ 14. *Rule for compound addition.* Arrange like quantities under like; add the figures of the lower denomination; and conſider how many of the next higher denomination the ſum contains; carry that number to the higher denomination, and write the overplus at the foot of the column. Proceed in like manner through all the denominations.

Note 1. When you add a denomination which contains more columns than one, and from which you carry to the higher by 20, 30, or any even number of tens, firſt add the units of that column, and mark down their ſum, carrying the tens to the next column; then add the tens, and carry to the higher denomination by the number of tens that it contains of the lower. For example, in adding ſhillings, carry by 10 from the units to the tens, and by 2 from the tens to the pounds.

Note 2. If you do not carry by an even number of tens, firſt find the complete ſum of the lower denomination, then inquire how many of the higher that ſum contains, and carry accordingly, and mark the remainder, if any, under the column. For example, if the ſum of a column of pence be forty-three, which is three ſhillings and ſevenpence, mark 7 under the pence-column, and carry 3 to that of the ſhillings.

Note 3. Some add the lower denominations after the following method: When they have reckoned as many as amounts to one of the higher denomination, or upwards, they mark a dot, and begin again

again with the excess of the number reckoned above the value of the denomination. The number of dots shows how many are carried, and the last reckoned number is placed under the column.

Examples for Practice in Sterling Money.

L	145	6	8	L	16	9	11½	L	72	13	9½
	215	3	9		169	16	10		63	12	5½
	172	18	4		36	12	9½		58	18	8½
	645	7	7		54	7	6		99	19	9½
	737	2	3		30	—	1½		77	17	7½
	35	3	9		7	19	6		63	2	6½
	9	—	7		707	19	11		87	13	5—
	1764	12	3		14	14	4		96	15	3½
	780	—	—		84	18	8½		72	12	2½
	99	9	9		125	3	7		33	3	3½
	150	10	—		16	16	8½		11	11	1½
	844	8	7		62	5	3		90	17	7½

Averdupois Weight.

T.	C.	qr.	lb.	T.	C.	qr.	lb.	qr.	lb.	oz.	dr.
1	19	3	26	3	15	2	22	3	22	15	7
—	14	1	16	6	3	—	19	2	26	14	9
2	18	1	16	5	7	3	26	1	24	13	11
—	1	2	27	3	2	2	—	—	12	12	13
3	9	—	10	4	3	1	10	1	15	10	14
—	17	2	24	—	18	1	12	2	18	8	2
—	15	3	18	1	1	1	1	3	17	6	8
4	6	—	5	5	3	—	7	3	19	4	7
—	6	3	9	6	4	—	9	2	20	2	9
6	4	—	4	4	6	—	5	2	8	3	3
5	5	—	5	2	1	3	4	1	18	5	1

Troy Weight.

lb.	oz.	dwt.	gr.	lb.	oz.	dwt.	gr.	lb.	oz.	dwt.	gr.	m.
5	8	12	15	36	11	16	23	3	7	18	22	12
1	3	9	16	7	8	12	16	2	8	17	23	15
1	3	17	20	6	10	14	21	15	9	13	18	17
—	4	5	12	—	7	7	6	9	10	19	21	13
—	—	18	8	76	9	15	18	8	3	19	3	16
—	—	—	7	8	4	12	21	12	5	15	9	5
—	—	12	3	1	10	7	15	6	2	12	20	4

English

Engliſh Dry Meaſure.

Q.	B.	G.	q.	p.	Q.	B.	G.	B.	P.	G.	p.
3	5	5	3	1	5	3	7	7	2	1	7
7	6	7	2	—	6	7	5	4	2	—	5
8	4	5	1	—	18	2	3	6	1	—	4
7	7	6	2	1	17	1	1	6	2	1	3
4	3	2	—	—	1	7	7	5	3	1	3
8	3	5	—	—	5	5	5	3	2	1	2
4	4	7	—	—	7	6	5	6	1	1	1
6	5	7	—	—	9	3	2	2	1	—	2
6	3	5	—	—	7	—	7	4	3	1	3

Scots Dry Meaſure.

Ch.	B.	F.	P.	L.	Ch.	B.	F.	P.	L.	B.	F.	P.
3	9	3	2	1	7	10	3	3	2	136	3	2
5	12	2	3	1	3	14	—	3	3	724	3	1
1	7	1	—	1	6	7	2	1	—	286	1	3
1	6	3	—	—	36	15	2	—	3	337	2	3
4	2	2	3	1	17	12	1	2	3	986	2	2
2	7	2	—	—	16	14	—	3	2	753	1	—
2	7	3	—	—	7	7	2	—	1	205	1	2
4	2	2	2	2	5	4	3	2	1	666	3	3

Engliſh Land Meaſure.

A.	R.	P.	Y.	A.	R.	P.	Y.	A.	R.	P.	Y.
367	3	27	19	5	3	18	22	365	1	35	28
2	2	32	1	19	1	30	23	179	—	36	21
89	2	16	12	17	3	10	—	99	1	23	14
8	1	—	16	12	2	15	18	54	3	24	7
76	—	24	18	6	1	12	7	27	2	18	5
3	1	7	8	108	2	—	—	13	3	17	12
876	2	28	4	17	3	5	4	336	3	39	9
4	—	16	17	534	—	8	9	800	1	11	8
3	2	5	18	694	3	7	9	227	—	27	3
2	2	7	—	63	—	4	3	118	2	15	2

Scots Land Meaſure.

A.	R.	F.	E.	A.	R.	F.	E.	A.	R.	F.	E.
42	3	5	18	98	2	39	34	9	3	33	33
12	1	7	3	7	1	16	27	72	2	28	22
16	3	2	9	167	1	12	15	15	1	19	29
18	2	14	11	4	3	34	26	16	—	26	35
11	3	—	12	67	1	12	18	18	1	18	28
19	—	3	7	7	2	23	14	19	1	39	27
15	—	15	15	74	1	16	—	12	3	24	25
23	—	4	7	42	3	18	25	18	2	11	9

				<i>Long Measure.</i>								
M.	F.	P.	r.	M.	F.	P.	r.	f.	in.	Lea.	M.	F.
1	3	12	4	9	7	31	4	2	5	107	2	3
2	5	18	3	67	4	16	2	1	3	13	1	4
3	4	21	1	2	—	32	1	—	8	18	2	5
2	6	17	—	7	6	39	3	—	7	29	1	6
4	7	32	2	9	5	16	2	1	10	13	2	7
8	4	12	—	8	7	27	3	1	11	12	—	2
—	7	—	—	19	6	14	2	1	—	9	2	1

				<i>Time.</i>					
Da.	Ho.	Min.	Sec.	Da.	Ho.	Min.	Sec.	Years.	Days.
200	15	12	8	3	15	12	18	185	226
56	13	28	34	4	8	38	17	312	300
128	17	19	19	2	13	42	27	77	102
38	15	—	59	5	17	53	37	36	148
217	17	49	38	6	19	19	47	919	299
356	9	19	19	1	23	23	27	136	238

§ 15. When one page will not contain the whole accompt, we add the articles it contains, and write against their sum, *Carried forward*; and we begin the next page with the sum of the foregoing, writing against it, *Brought forward*.

When the articles fill several pages, and their whole sum is known, which is the case in transcribing accompts, it is best to proceed in the following manner: Add the pages, placing the sums on a separate paper; then add the sums, and if the amount of the whole be right, it only remains to find what numbers should be placed at the foot and top of the pages. For this purpose, repeat the sum of the first page on the same line; add the sums of the first and second, placing the amount in a line with the second; to this add the sum of the third; placing the amount in a line with the third. Proceed in like manner with the others, and if the last sum corresponds with the amount of the pages, it is right. These sums are transcribed at the foot of the respective pages and top of the following ones.

Example.

L. 134	6	8	L.			L.			L.		
42	3	9	170	5	4	70	4	2	15	3	9
175	4	9	66	9	8	18	6	8	12	2	6
42	5	7	73	8	6	12	13	2	7	5	4
163	7	4	45	3	2	15	3	9	8	—	—
148	5	3	78	7	9	17	5	4	—	9	6
73	2	3	12	—	—	18	6	8	—	5	10
L.			L.			L.			L.		

1st Page,

1st Page, L. 778 16 — L. 778 16 —

2d, 445 14 5 1224 10 5

3d, 151 19 9 1376 10 2

4th, 43 6 11 1419 17 1

L. 1419 17 1

Then we transcribe
L. 778 : 16s. at the foot
of the first and top
of the second pages,
L. 1224 : 10 : 5 at the foot
of the second and top of
the third; and so on.

CHAP. III.

SUBTRACTION.

§ 16. **SUBTRACTION** is the operation by which we take a lesser number from a greater, and find their difference. It is exactly opposite to addition, and is performed by learners in a like manner, beginning at the greater and reckoning downwards the units of the lesser. The greater is called the **MINUEND**, and the lesser the **SUBTRAHEND**.

If any figure of the subtrahend be greater than the corresponding figure of the minuend, we add ten to that of the minuend; and having found and marked the difference, we add one to the next place of the subtrahend. This is called borrowing ten. The reason will appear, if we consider, that when two numbers are equally increased by adding the same to both, their difference will not be altered. When we proceed, as directed above, we add ten to the minuend, and we likewise add one to the higher place of the subtrahend, which is equal to ten of the lower place.

Rule. Place the subtrahend under the minuend, and subtract units from units, tens from tens; and so on. If any figure of the subtrahend be greater than the corresponding one of the minuend, borrow ten.

Examples.

Minuend	173694	738641	738564	1178235
Subtrahend	21453	379235	659782	862970

Remainder	152241	359406
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§ 17. To prove subtraction, add the subtrahend and remainder together; if their sum be equal to the minuend, the operation is right.

Or, subtract the remainder from the minuend. If the difference be equal to the subtrahend, the operation is right.

§ 18. **Rule for compound subtraction.** Place like denominations under like, and borrow, when necessary, according to the value of the higher place.

Examples.

L. 146	3	3	C.	qr.	lb.	A.	R.
58	7	6	12	3	19	15	2
			4	3	24	12	2
L. 87	15	9	7	3	23	2	3
						28	11

Note

Note 1. The reason for borrowing is the same as in simple subtraction. Thus, in subtracting pence, we add twelve pence when necessary to the minuend, and, at the next step, we add one shilling to the subtrahend.

Note 2. When there are two places in the same denomination, if the next higher contain exactly so many tens, it is best to subtract the units first, borrowing ten when necessary, and then subtract the tens, borrowing when necessary, according to the number of tens in the higher denomination.

Note 3. If the value of the higher denomination be not an even number of tens, subtract the units and tens at once, borrowing according to the value of the higher denomination.

Note 4. Some choose to subtract the place in the subtrahend when it exceeds that of the minuend, from the value of the higher denomination, and add the minuend to the difference.

Note 5. As custom has established the method of placing the subtrahend under the minuend, we follow it when there is no reason for doing otherwise; but the minuend may be placed under the subtrahend with equal propriety; and the learner should be able to work either way with equal readiness, as this last is sometimes more convenient: of which instances will occur afterwards.

Note 6. The learner should also acquire the habit, when two numbers are marked down, of placing such a number under the lesser, that when they are added together, the sum may be equal to the greater. The operation is the same as subtraction, though conceived in a different manner, and is useful in balancing accounts, and on other occasions.

Examples for Practice in Sterling Money.

$$\begin{array}{r} \text{L. } 1472 \quad 3 \quad 9 \\ \quad 846 \quad 12 \quad 3 \\ \hline \end{array}$$

$$\begin{array}{r} \text{L. } 1764 \quad 9 \quad 1 \\ \quad 1235 \quad 15 \quad 10 \\ \hline \end{array}$$

$$\begin{array}{r} \text{L. } 1375 \quad 3 \quad 6 \\ \quad 465 \quad 3 \quad 7 \\ \hline \end{array}$$

Avoirdupois Weight.

$$\begin{array}{r} \text{T. C. qr. lb.} \\ 4 \quad 4 \quad 2 \quad 12 \\ 1 \quad 4 \quad 3 \quad 7 \\ \hline \end{array}$$

$$\begin{array}{r} \text{T. C. qr. lb.} \\ 1 \quad 18 \quad 2 \quad 9 \\ 1 \quad 12 \quad 1 \quad 17 \\ \hline \end{array}$$

$$\begin{array}{r} \text{T. C. qr. lb.} \\ 4 \quad 12 \quad 2 \quad 9 \\ 1 \quad 17 \quad 3 \quad 12 \\ \hline \end{array}$$

Apothecaries Weight.

$$\begin{array}{r} \text{lb } \frac{3}{4} \quad 3 \quad \text{ʒ} \quad \text{gr.} \\ 5 \quad 7 \quad 5 \quad 2 \quad 12 \\ 2 \quad 7 \quad 6 \quad 2 \quad 15 \\ \hline \end{array}$$

$$\begin{array}{r} \text{lb } \frac{3}{4} \quad 3 \quad \text{ʒ} \quad \text{gr.} \\ 8 \quad 5 \quad 4 \quad 1 \quad 9 \\ 6 \quad 6 \quad 2 \quad 2 \quad 12 \\ \hline \end{array}$$

$$\begin{array}{r} \text{lb } \frac{3}{4} \quad 3 \quad \text{ʒ} \quad \text{gr.} \\ 7 \quad 3 \quad 4 \quad 2 \quad 17 \\ 4 \quad 5 \quad 7 \quad 1 \quad 19 \\ \hline \end{array}$$

English Land Measure.

$$\begin{array}{r} \text{A. R. P. r.} \\ 12 \quad 3 \quad 18 \quad 30 \\ 10 \quad 1 \quad 20 \quad 12 \\ \hline \end{array}$$

$$\begin{array}{r} \text{A. R. P. r.} \\ 17 \quad 1 \quad 18 \quad 12 \\ 5 \quad 2 \quad 5 \quad 25 \\ \hline \end{array}$$

$$\begin{array}{r} \text{A. R. P. r.} \\ 104 \quad 3 \quad 19 \quad 19\frac{1}{2} \\ 20 \quad 3 \quad 15 \quad 20 \\ \hline \end{array}$$

Scots

Scots Land Measure.

<i>A.</i>	<i>R.</i>	<i>F.</i>	<i>E.</i>	<i>A.</i>	<i>R.</i>	<i>F.</i>	<i>E.</i>	<i>A.</i>	<i>R.</i>	<i>F.</i>	<i>E.</i>
18	3	19	17	72	1	13	24	12	3	5	2
11	2	12	12	19	3	4	26	2	3	6	19

Long Measure.

<i>M.</i>	<i>F.</i>	<i>P.</i>	<i>r.</i>
3	2	13	4
1	3	20	5

English Dry Measure.

<i>Q.</i>	<i>B.</i>	<i>G.</i>
15	3	5
7	7	6

Scots Dry Measure.

<i>Ch.</i>	<i>B.</i>	<i>F.</i>	<i>P.</i>	<i>L.</i>
15	6	3	2	1
12	12	1	2	3

§ 19. Before the learner proceed to arrange the following exercises, we must acquaint him, that it is often necessary to place the sums in different columns, in order to exhibit a clear view of what is required. For instance, if the values of several parcels of goods are to be added, and each parcel consists of several articles, the particular articles should be placed in an inner column, and the sum of each parcel extended to the outer column, and the total added there.

If any person be owing an accompt, and has made some partial payments, the payments must be placed in an inner column, and their sum extended under that of the accompt in the outer column, and subtracted there.

An example or two will make this plain.

1st, 30 Yards linen at 2s.	L. 3	—	—
45 Ditto at 1s. 6d.	3	7	6
	L. 6 7 6		
120 lb. Thread at 4s.	L. 24	—	—
40 Ditto at 3s.	6	—	—
30 Ditto at 2s. 6d.	3	15	—
	33 15		
	L. 40 2 6		

2d, 1773.

Jan. 15. Lent James Smith	L. 50	—	—
22. Lent him further	70	—	—
	L. 120 — —		
Feb. 3. Received in part	L. 62	—	—
5. Received further			
In gold	L. 10	10	
In silver	13	—	
	23 10 —		
	85 10		
Balance due me	L. 34	10	
	The		

The convenience of this arrangement is obvious. Sometimes three, four, or more columns are necessary. The right-hand column is called the *outer column*, the next is called the *inner* or *first inner*, the next the *second inner*; and so on. The columns should be of equal wideness, and the pence-place of one should be as near to the pounds-place of the next, as it can stand, without confusion. When a sum is extended, the figures should be placed even with the line that is drawn under the inner column.

Exercises in Addition and Subtraction.

I. Accompt of the Weight of 10 Hogsheads Sugar.

	Cwt. qr. lb.				Cwt. qr. lb.		
No. 1.	14	3	25	Tare	—	2	1
2.	17	2	26		—	2	15
3.	18	1	9		—	3	17
4.	15	2	22		—	3	7
5.	17	3	4		—	2	5
6.	16	3	19		—	3	11
7.	14	2	12		—	2	14
8.	19	1	10		—	2	19
9.	13	2	—		—	3	5
10.	13	2	—		—	2	3

Required the nett weight of each hoghead, and the gross, tare, and nett weight of the whole?

II. A merchant has in ready money L. 43 : 12 : 9; goods, value L. 756 : 14 : 8; a ship, value L. 415. Debts due to him amount to L. 1236 : 6 : 9. He owes Thomas Poole L. 54 : 9 : 7; John Tucker L. 712 : 16 : 6; James Withers L. 141 : 11 : 9; William Norris L. 386 : 19 : 3; David Webb L. 74 : 6 : 8. Required his nett stock?

III. A merchant buys a ship for L. 540, pays for rigging and repairs L. 96 : 13 : 4, for victualling L. 48 : 12 : 6, for seamens wages L. 19 : 16 : 4, and for insurance L. 45; the master receives the following freights: From Leith to Lisbon, L. 32 : 3 : 0; from Lisbon to Madeira, L. 48 : 15 : 9; from Madeira to Barbadoes, L. 35 : 15 : 7; from Barbadoes to London, L. 187; and from London to Leith as follows: From James Spence, L. 36 : 5 : 9; from Thomas Vernon, L. 11 : 3 : 7; from William Hislop, L. 6 : 12; from John Dunning, L. 12 : 3 : 11. During the voyage the shipmaster pays for repairs, L. 38 : 12 : 9; for wages, L. 75 : 18 : 4; for victualling, L. 26 : 12 : 9; and the ship is sold at its return for L. 525. Required the gain or loss?

IV. A merchant became bankrupt. He owed James Darby per accompt L. 427 : 13 : 9; John Peebles, per ditto, L. 716 : 12 : 3; Robert Franklin, per ditto, L. 814 : 17 : 9; Ja. Beckwith, per ditto, L. 219 : 18 : 4; and the following bills: To Thomas Pemberton L. 300 : 17 : 2, to Samuel French L. 512, to Alexander Newton

L. 400, to David Boyle L. 1260; also, a bond to James Alcock L. 2000. His effects were the following: Accompts, due him by William Coleman L. 42 : 19 : 4, by Charles Hewit, L. 15 : 12 : 6; by Charles Hood, L. 207 : 3 : 3; by Thomas Chandler, L. 416 : 6 : 6; by Harris and Smith, L. 213 : 6 : 2. Bills, due by John Philips L. 107; by William Baldwin L. 403 : 2 : 6; by James Pemble L. 714 : 3 : 2; by William Roberts L. 100, whereof paid L. 30; by Thomas Stone L. 48. A house, value L. 520. Another, value L. 416. Household-furniture, L. 119 : 15 : 5. Books, L. 25 : 10 : 3. And the following goods: Cloth, value L. 176 : 9s.; linens, which were sold in 3 lots, for L. 92 : 14 : 6, L. 72, and L. 58 : 3 : 9. Six hds. Port-wine, at L. 15 : 15s. each; 456 lb. flax, at 1s. per lb.; and sundry other articles, to the value of L. 98 : 14s. Required a state of his affairs, distinguishing each kind of debt and property; and the deficiency, allowing L. 40 for the expence of settling them?

V. A gentleman lets lands to the following tenants: To William Chrystie, 18 acres 3 roods 16 poles, all arable; to David Morgan, 32 a. 2 r. 27 p. 19 y. arable, and 35 a. 1 r. 7 p. 9 y. pasture; to James Worrel, 19 a. 1 r. 32 p. 18 y. arable, and 34 a. 10 p. pasture; to Edward Booth, 32 a. 2 r. 36 p. 24 y. arable, and 14 a. 2 p. 9 y. pasture; to Charles Telfer, 27 a. 3 r. 23 p. 27 y. arable, and 29 a. 3 r. 19 p. 18 y. pasture; to Robert Smith, 29 a. 1 r. 3 p. 12 y. arable, and 36 a. 12 y. pasture; to James Selwyn, 30 a. 2 r. 19 p. 22 y. arable, and 15 a. pasture; to James Dobson, 11 a. 3 r. 7 p. arable, and 2 r. pasture; to Henry Grove, 32 a. arable, and 12 a. 2 r. pasture; to William Murray, 18 a. 2 r. 30 p. arable; and to William Bull, 3 r. 19 p. 14 y. arable, and 14 a. 2 r. 3 p. 7 y. pasture.

His estate measures 523 a. 2 r. 20 p. arable, and 315 a. 2 r. 12 p. 20 y. pasture. Required how much land remained in his own hands?

VI. A ship, burden 74 ton, was loaded with the following goods: Eight hogsheds, N^o 1—9 cwt. 3 qr. 15 lb. N^o 2—10. 2. 12. N^o 3—12. 3. 4. N^o 4—13. 2. 11. N^o 5—9. 3. 26. N^o 6—11. 2. 19. N^o 7—9. 3. 9. N^o 8—14. 2. 17. Six boxes, N^o 1—1 cwt. 3 qr. 3 lb. N^o 2—1. 3. 9. N^o 3—1. 2. 25. N^o 4—1. 2. 18. N^o 5—1. 3. 4. N^o 6—2 cwt. Sixteen bales, qt. N^o 1—3 cwt. 3 q. 9 lb. N^o 2—2. 3. 17. N^o 3—4. 2. 16. N^o 4—3. 1. 7. N^o 5—3. 1. 1. N^o 6—3. 2. 5. N^o 7—2. 3. 12. N^o 8—4. 1. N^o 9—3. 2. 17. N^o 10—3. 2. 16. N^o 11—1. 3. 24. N^o 12—1. 3. 9. N^o 13—3. 3. 14. N^o 14—3. 2. 4. N^o 15—3. 1. 18. N^o 16—4. 2. 18. Also 18 barrels, weighing each 3 cwt. 1 qr. 10 lb. 30 tons hemp, 5 tons 14 cwt. 3 q. 17 lb. flax, and as much iron as exactly completes the burden. Required the quantity of iron?

VII. A corn-merchant had on hand 50 chalders wheat. He
C bought

bought at one time 42 ch. 12 b. 3 f.; at another time, 15 ch. 6 b. 2 f. He sold at one time 15 ch. 3 b. 2 f.; at another, 8 ch. 14 b. 3 f.; at another, 27 ch. 12 b. 2 f.; at another, 15 b. 1 f. 1 p.; at another, 9 b. 3 f. 3 p.; at another, 7 b. 3 f. 3 p.; after which, there remained in his granary 53 ch. 14 b. 1 f. 3 p. Required the deficiency?

VIII. The distance from London to Barnet is 11 miles 12 poles 3 yards; from thence to Hatfield, 9 m. 1 f. 2 p.; from thence to Stephenage, 12 m. 3 p. 2 y.; from thence to Biggleswade, 14 m. 1 f. 4 y.; from thence to Bugden, 16 m. 6 p.; from thence to Stilton, 14 m. 13 p.; from thence to Stamford, 14 m. 13 p. 5 y.; from thence to Coleworth, 14 m. 1 p. $3\frac{1}{2}$ y.; from thence to Grantham, 8 m. 1 f. 1 y.; from thence to Newark, 14 m. 2 p.; from thence to Tuxford, 13 m. 2 y.; from thence to Doncaster, 24 m. 1 f. 7 p.; from thence to Ferry-bridge, 15 m.; from thence to York, 22 m. 12 p. 1 y. Required the distance from London to York, and from each of these towns to each other one?

IX. Required the age of the world at the time of the flood, from the 5th chapter of Genesis, and the 6th verse of the 7th chapter; also, the length of time from the flood to the call of Abraham, from 10th and following verses of the 11th chapter, and 1st verse of the 17th chapter.

X. The annual revenue of Britain is estimated as follows: Customs, L. 4,586,463; excise, L. 5,392,642; stamp-duties, L. 1,162,695; land and malt tax, L. 2,600,000; other taxes, L. 1,358,115. The annual expences in time of peace for the army, L. 1,600,000; navy, L. 1,800,000; ordonance, L. 348,000; militia, L. 91,000; civil list, L. 900,000; miscellaneous services, L. 74,274; interest of public debt, L. 9,275,796. Required the surplus or deficiency?

XI. I carried to a fair L. 507, and received there from James Hume, L. 35 : 14 : 2; from Alexander Law, L. 17 : 9 : 6; from William Fleming, L. 90; from Samuel Hunter, L. 43; and from Alexander Clark, 12s. 6d. I paid the following debts: To Andrew Hay, L. 45 : 3 : 9; to William Hill, L. 18 : 12 : 6; to Paterfon and Leslie, L. 13 : 3 : 4; to Alexander Grieve, L. 17 : 5 : 2; to John Berry, L. 19 : 9 : 9; to William Gardiner, L. 11 : 6s.; to Thomas Alison, 8s. 4d. I bought for ready money linens, value L. 109 : 3 : 4; Of-naburgs, L. 153 : 9s.; yarn, L. 17 : 4 : 8; thread, L. 19 : 13 : 4. My expences came to L. 2 : 15s. Required how much I should bring home?

XII. A mercer has in ready money L. 17 : 12 : 9, and the following goods: Broad cloth, value L. 128 : 13 : 5; shalloons, L. 12 : 8 : 9; thread, L. 1 : 6 : 7; buckram, L. 3 : 12 : 8; hardware, L. 26 : 3 : 9; silk, L. 17 : 11 : 6; hats, L. 12 : 12 : 3. Also a house and shop, value L. 105. James Hill owes him, per bond, L. 700, and David Gray,

Gray, per ditto, L. 1500: William Innes, per accompt, L. 13:3:5; James Moubray, per ditto, L. 19:16:4; David Grierson, L. 18:6:8; Henry Hardie, L. 9:4:3; David Gray, L. 7:0:5; Alexander McMillan, 12s. 9d.; William McDowal, 16s. 4d.; Thomas Paterfon, L. 3:8:5; Henry Walker, L. 6:12:9; Charles Duncan, 15s. 9d.

He owes James Frazer, per bill, L. 615; D. Campbell, per ditto, L. 124, and interest L. 12:3s.; Will. Hislop, per ditto, L. 200, whereof paid L. 50, and interest L. 8:3:9; to David Bruce, per ditto, L. 18; and the following accompts: To William Mitchell, L. 17:12:3; to Henry Thomson, L. 14:3:2; to William Brown, L. 18:17:7; to Edward Bennet, L. 19:12:9; to Char. Duff, L. 16:3:5; to Will. Abercrombie, L. 14:9:6; to John Robertson, L. 12; to Thomas Ramfay, 18s. 6d.; to Leighton and Chalmers, 11s. 4d.; to the Bank of Scotland, L. 115:3:9. Required his nett stock?

XIII. A minister's stipend is paid by the heritors as follows: James Speers pays 3 bolls 3 firlots 1 peck 3 lippies oats, 2 bolls barley, and L. 3:15:4; David Burns, 1 b. 2 f. oats, and L. 2:7:8; Samuel Banantyne, 2 f. oats, 1 b. 1 f. 1 p. 1 l. barley, and 10s. 6d.; William Frazer, 4 b. 2 f. 2 l. oats, 3 b. barley, and L. 12:2s.; Henry Moncrief, 1 c. oats, and 1 guinea; Richard Murray, 1 b. oats, and 2 f. 2 p. barley; Samuel French, 2 f. oats, 2 f. barley, and L. 5:5s.; Malcolm Ogilvie, 5 b. barley; William Fiddes, 1 b. oats, and L. 2:3s.; Thomas Summerville, 2 b. oats, 2 f. 2 l. barley, and 13s. 4d.; James McLeish, 1 b. barley, and 16s. 8d.; James Petrie, 2 b. oats, 2 b. barley, and L. 25. Required a distinct accompt of the same?

XIV. Required a rental of William Irvine's estate, consisting of the following farms: Westertown, possessed by James Milne, measuring 140 acres 3 roods 12 falls, rent 12 bolls 3 firlots 2 pecks barley, 24 hens, 18 carriages, and L. 75. Eastertown, William Hunter, 124 a. 2 r. 20 f.; rent 36 hens and L. 66:12:3. Upper Mains, A. Lawfon, 78 a. 1 r.; rent, 3 b. 3 f. 2 p. 2 l. barley, 42 hens, 6 carriages, and L. 31:10s. Nethermaines, J. Brown, 122 a. 3 r. 13 f.; rent, 18 b. barley, 18 hens, 14 carriages, and L. 86:13:4. Hillside, Thomas Gilchrist, 174 a. 2 r. 18 f.; rent, 7 b. 2 f. barley, 30 hens, and L. 105. Haughead, R. Bruce, 130 a.; rent, 3 b. 2 f. 2 p. barley, 26 hens, and L. 70:9:2. Woodside, Lawrence Burnet, 99 a. 3 r. 20 f.; rent, 18 hens, 12 carriages, and L. 53. Broomfield, Charles Todd, 156 a. 2 r. 12 f.; rent, 5 b. 1 f. barley, 20 hens, and L. 70. Marytown, D. Law, 148 a. 3 r. 7 f.; rent, 3 b. 2 f. barley, 34 hens, and L. 62:12s. Braepark, William Blair, 84 a. 2 r. 15 f.; rent 18 hens, 18 carriages, and L. 53:7:9. Sandside, J. Hill, 56 a. 1 r. 17 f.; rent, 5 bolls bear, 12 hens, and L. 21.

XV. From the creation of the world till the departure of the Israelites from Egypt, was 2513 years; to the siege of Troy, 307 years

years more; to the building of Solomon's temple, 180 years; to Homer's time, 97 years; to the establishment of the Spartan government by Lycurgus, 23 years; to the first Olympiad, 108 years; to the building of Rome, 23 years; to the Jewish captivity, 147 years; return of the Jews, 70 years; to the expulsion of the Kings from Rome, 27 years; to the beginning of the Peloponnesian war, 78 years; to the burning of Rome by the Gauls, 41 years; to the conquest of Persia by Alexander, 57 years; to the first Punic war, 69 years; to the destruction of Carthage, 118 years; to the death of Julius Cæsar, 102 years; to the Christian æra, 44 years. Required the time from the creation to the Christian æra?

XVI. William the Conqueror acquired the throne of England on the 26th of December 1066, and died 8th September 1087; his son and successor, William II. surnamed Rufus, died 2d August 1100, as did his brother Henry I. 10th December 1135; upon which Stephen usurped the throne, and held it till his death 25th October 1154. Henry II. grandson of Henry I. died 6th July 1189; his son, Richard I. 6th April 1199; his brother, John, granted the great charter 15th June 1215, and died 18th October 1216; his son, Henry III. died 16th November 1272; his son, Edward I. 7th July 1307; his son, Edward II. was deposed 7th June 1327; his son, Edward III. died 21st June 1377; his son, Richard II. was deposed 28th September 1399 by the Duke of Lancaster, who assumed the crown under the name of Henry IV. and died 20th March 1413; his son, Henry V. died 31st August 1422; his son, Henry VI. was deposed 3th March 1461 by the Duke of York, afterwards Edward IV. who died 9th April 1482, leaving the throne to his young son Edward V. but Richard III. his uncle, usurped it 25th June 1483, and murdered his nephew, and was slain at the battle of Bosworth 22d August 1485, by the Duke of Richmond, who obtained the kingdom under the name of Henry VII. upon which the contention between the houses of York and Lancaster was ended; he died 22d April 1509; his son, Henry VIII. died 28th January 1547; his son, Edward VI. 6th July 1553; his sister, Queen Mary, 15th November 1558; her sister, Queen Elizabeth, 4th March 1603; upon which James I. King of Scotland acceded to the throne of England, and died 27th March 1625, his son, Charles I. was beheaded 30th January 1649; his son, Charles II. was restored 29th May 1660, and died 6th February 1685; his brother, James II. abdicated the crown 23d December 1688, and William III. Prince of Orange was elected King, who died 8th March 1702. Queen Anne, daughter to James II. died 1st August 1714. George I. Elector of Hanover, succeeded, and died 11th June 1727; his son, George II. died 25th October 1760, and was succeeded by George III. his present Majesty. Required the length of each reign, and the whole time from William the Conqueror to the present, distinguishing the time before passing the great charter—the accession of the house of Lancaster—the battle of

of Bosworth—the accession of the King of Scotland—the revolution—and the accession of the house of Hanover?

XVII. The value of goods imported from Sweden for 5 years, from 1762 to 1766, inclusive, was L. 201160, L. 249540, L. 253280, L. 234452, L. 195499; from Russia, during the same years, L. 627451, L. 801279, L. 920293, L. 967339, L. 684585; from Spain, L. 131279, L. 590506, L. 503489, L. 594893, L. 558002; from Portugal, L. 359127, L. 304056, L. 312974, L. 354307, L. 347806; from Holland, L. 493944, L. 476383, L. 371730, L. 420273, L. 374587; from Germany, L. 516489, L. 1085107, L. 606410, L. 602624, L. 633672.

The exports to Sweden during these years were, L. 17507, L. 20494, L. 28351, L. 49003, L. 59678; to Russia, L. 61509, L. 78901, L. 67952, L. 76170, L. 109900; to Spain, L. 139580, L. 1168072, L. 1318345, L. 1237551, L. 1078731; to Portugal, L. 908729, L. 727623, L. 1266998, L. 679037, L. 667101; to Holland, L. 2107957, L. 1910240, L. 2040467, L. 2026772, L. 1602924; to Germany, L. 2435106, L. 2272272, L. 2379315, L. 1869465, L. 1811268. Required the amount of the exports and imports each year, and to each country; the balance of trade with each country for each year; the whole balance each year; the whole balance with each country; and the general balance for all the years?

CHAP. IV.

MULTIPLICATION.

§ 20. **I**N multiplication, two numbers are given, and it is required to find how much the first amounts to, when reckoned as many times as there are units in the second. Thus, 8, multiplied by 5, or 5 times 8, is 40. The given numbers (8 and 5) are called **FACTORS**; the first (8) the **MULTIPLIER**; the second (5) the **MULTIPLICAND**; and the amount (40) the **PRODUCT**.

This operation is nothing else than addition of the same number repeated several times. If we mark 8 five times under each other, and add them, the sum is 40: But as this kind of addition is of frequent and extensive use; in order to shorten the operation, we mark down the number only once, and conceive it to be repeated as often as there are units in the multiplier.

§ 21. For this purpose the learner must be thoroughly acquainted with the following multiplication-table, which is composed by adding each digit twelve times. He should not only commit it to memory, but satisfy himself of its truth, by adding the numbers; and not desist, till he can recollect every product, when required, without hesitation.

Twice		Thrice		Four times		Five times		Six times		Seven times	
1	is 2	1	is 3	1	is 4	1	is 5	1	is 6	1	is 7
2	4	2	6	2	8	2	10	2	12	2	14
3	6	3	9	3	12	3	15	3	18	3	21
4	8	4	12	4	16	4	20	4	24	4	28
5	10	5	15	5	20	5	25	5	30	5	35
6	12	6	18	6	24	6	30	6	36	6	42
7	14	7	21	7	28	7	35	7	42	7	49
8	16	8	24	8	32	8	40	8	48	8	56
9	18	9	27	9	36	9	45	9	54	9	63
10	20	10	30	10	40	10	50	10	60	10	70
11	22	11	33	11	44	11	55	11	66	11	77
12	24	12	36	12	48	12	60	12	72	12	84

Eight times		Nine times		Ten times		Eleven times		Twelve times	
1	is 8	1	is 9	1	is 10	1	is 11	1	is 12
2	16	2	18	2	20	2	22	2	24
3	24	3	27	3	30	3	33	3	36
4	32	4	36	4	40	4	44	4	48
5	40	5	45	5	50	5	55	5	60
6	48	6	54	6	60	6	66	6	72
7	56	7	63	7	70	7	77	7	84
8	64	8	72	8	80	8	88	8	96
9	72	9	81	9	90	9	99	9	108
10	80	10	90	10	100	10	110	10	120
11	88	11	99	11	110	11	121	11	132
12	96	12	108	12	120	12	132	12	144

§ 22. If both factors be under 12, the table exhibits the product at once. If the multiplier only be under 12, we begin at the unit-place, and multiply the figures in their order, carrying the tens to the higher place, as in addition.

Example. 76859 multiplied by 4, or 76859 added 4 times.

$$\begin{array}{r}
 76859 \\
 76859 \\
 76859 \\
 76859 \\
 \hline
 307436
 \end{array}$$

If the multiplier be 10, we annex a cypher to the multiplicand. If the multiplier be 100, we annex two cyphers; and so on. The reason is obvious, from the use of cyphers in notation.

If the multiplier be any digit, with one or more cyphers on the right-hand, we multiply by the figure, and annex an equal number of cyphers to the product. Thus, if it be required to multiply by 50, we first multiply by 5, and then annex a cypher.

If the multiplier consist of several significant figures, we multiply separately by each, and add the products. It is the same as if we had divided a long account of addition into parts corresponding to the figures of the multiplier.

Example,

Example. To multiply 7329 by 365.

$\begin{array}{r} 7329 \\ 5 \\ \hline 36645 \end{array}$	$\begin{array}{r} 7329 \\ 60 \\ \hline 439740 \end{array}$	$\begin{array}{r} 7329 \\ 300 \\ \hline 2198700 \end{array}$	$\begin{array}{r} 36645 = 5 \text{ times.} \\ 439740 = 60 \text{ times.} \\ 2198700 = 300 \text{ times.} \\ \hline 2675085 = 365 \text{ times.} \end{array}$
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It is obvious that 5 times the multiplicand added to 60 times, and to 300 times the same, must amount to the product required. In practice, we place the products at once under each other, and as the cyphers arising from the higher places of the multiplier are lost in the addition, we omit them. Hence may be inferred the following.

§ 23. *Rule.* Place the multiplier under the multiplicand, and multiply the latter successively by the significant figures of the former; placing the right-hand figure of each product under the figure of the multiplier from which it arises; then add the products.

Examples.

$\begin{array}{r} 7329 \\ 365 \\ \hline 36645 \\ 43974 \\ 21987 \\ \hline 2675085 \end{array}$	$\begin{array}{r} 42785 \\ 91 \\ \hline 42785 \\ 385065 \\ \hline 3893435 \end{array}$	$\begin{array}{r} 37846 \\ 235 \\ \hline 189230 \\ 113538 \\ 75692 \\ \hline 8893810 \end{array}$	$\begin{array}{r} 93956 \\ 8704 \\ \hline 375824 \\ 657692 \\ 751648 \\ \hline 817793024 \end{array}$
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1st, 74387 by 459 2d, 83075 by 7684 3d, 74530 by 3256 4th, 43867 by 69458 5th, 74568 by 76392 6th, 84639 by 7695 7th, 54972386 by 8574 8th, 65873925 by 7842	9th, 24379 by 6842 10th, 37648 by 3759 11th, 56842 by 18642 12th, 21593 by 91573 13th, 36898 by 98979 14th, 46897 by 57987 15th, 576314298 by 57914 16th, 689215473 by 8623
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§ 24. A number which cannot be produced by the multiplication of two others, is called a PRIME NUMBER, as 3, 5, 7, 11, and many others.

A number which may be produced by the multiplication of two or more smaller ones, is called a COMPOSITE NUMBER. For example, 27, which arises from the multiplication of 9 by 3; and these numbers (9 and 3) are called the COMPONENT parts of 27.

Contractions and Varieties in Multiplication.

§ 25. First, If the multiplier be a composite number, we may multiply successively by the component parts.

Ex.

Ex. 7638 by 45 or 5 times 9	7638	1st, 5492 by 72
45	9	2d, 13759 by 56
		3d, 56417 by 144
38190	68742	4th, 73048 by 84
30552	5	5th, 166549 by 125
		6th, 378914 by 54
343710	343710	7th, 520813 by 63

§ 26. Secondly, If the multiplier be 5, which is the half of 10, we may annex a cypher and divide by 2. If it be 25, which is the fourth part of 100, we may annex two cyphers, and divide by 4. Other contractions of the like kind will readily occur to the learner.

§ 27. Thirdly, To multiply by 9, which is one less than 10, we may annex a cypher; and subtract the multiplicand from the number it composes. To multiply by 99, 999, or any number of 9's, annex as many cyphers, and subtract the multiplicand. The reason is obvious; and a like rule may be found, though the unit-place be different from 9; which we leave the learner to discover.

Ex. 1. 7342 by 9	Ex. 2. 43728 by 999	1st, 564 by 99
73420	43728000	2d, 3782 by 9999
7342	43728	3d, 7697 by 999
		4th, 3486 by 9998
66078	43684272	5th, 5739 by 997

§ 28. Fourthly, Sometimes a line of the product is more easily obtained from a former line of the same than from the multiplicand.

Ex. 1. 1372	Ex. 2. 1348	1st, 1537 by 63
84	36	2d, 1359 by 48
		3d, 1463 by 842
5488	8088	4th, 7326 by 693
10976	4044	5th, 563 by 284
		6th, 735 by 93
115248	48528	7th, 645 by 39

In the first example, instead of multiplying by 8, we may multiply 5488 by 2; and in the second, instead of multiplying by 3, we may divide 8088 by 2.

§ 29. Fifthly, Sometimes the product of two or more figures may be obtained at once, from the product of a figure already found.

Ex. 1. 14356	Ex. 2. 3462321	1st, 3522 by 54279
648	96484	2d, 8635 by 192648
		3d, 7537 by 3693
114848	13849284	4th, 5452 by 14497
918784	166191408	5th, 7638 by 81273
		6th, 53854 by 75255
9302688	332382816	7th, 9332 by 639
	334058579364	

In the Second Example, we multiply first by 4; then, because 12 times 4 is 48, we multiply the first line of the product by 12, instead of multiplying separately by 8 and 4; lastly, because twice 48 is 96, we multiply the second line of the product by 2, instead of multiplying separately by 6 and 9.

When we follow this method, we must be careful to place the right-hand figure of each product under the right-hand figure of that part of the multiplier from which it is derived.

It would answer equally well in all cases, to begin the work at the highest place of the multiplier; and contractions are sometimes obtained by following that order.

Ex. 1.	3125 or 3125	Ex. 2.	32452	1st,	5364	by	856
	642		52575	2d,	73284	by	749
				3d,	37368	by	735
	18750		162260	4th,	53682	by	54535
	12500		811300	5th,	64378	by	954216
	6250		2433900	6th,	36978	by	31545
				7th,	23286	by	61872
				8th,	42379	by	74284
	2006250		1706163900				

§ 30. It is a matter of indifference which of the factors be used as the multiplier; thus 4 multiplied by 3, gives the same product as 3 multiplied by 4. To illustrate this, we may mark three rows of points, four in each row, placing the rows under . . . each other; and we shall also have four rows . . . containing three points each, if we reckon the . . . rows downwards.

§ 31. Multiplication is proven by repeating the operation, using the multiplier for the multiplicand, and the multiplicand for the multiplier. It may also be proven by division, or by casting out the 9's; of which afterwards; and an accompt, wrought by any contraction, may be proven by performing the operation at large, or by a different contraction.

Compound Multiplication.

§ 32. RULE. I. *If the multiplier do not exceed 12, the operation is performed at once, beginning at the lowest place, and carrying according to the value of the higher place.*

Examples.	Cwt. qr. lb.	A. R. P.	lb. oz. dwt.
L. 13 6 7	12 2 8	13 3 18	7 5 9
	9	5	6
			12
L. 119 19 3	62 3 12	83 — 28	89 5 8
1st, L. 37 18 3½	by 9	5th, 15 cwt. 2 q. 17 lb.	by 6
2d, 118 12 11	by 12	6th, 12 a. 2 r. 15 p. 20 y.	by 7
3d, 136 18 2	by 8	7th, 15 lb. 3 oz. 17 dwt. 19 gr.	by 5
4th, 7634 12 7	by 7	8th, 12 bolls, 3 f. 2 p.	by 11

§ 33. RULE II. *If the multiplier be a composite number, whose component parts do not exceed 12, multiply first by one of these parts, then multiply the product by the other. Proceed in the same manner if there be more than two.*

Examples.

1st, L. 15 3 8 by 32 = 8×4 2d, L. 17 3 8 by 75 = $5 \times 5 \times 3$

L. 121 9 4 = 8 times
4

L. 51 11 — = 3 times
5

L. 485 17 4 = 32 times

L. 257 15 — = 15 times
5

T. Cwt. gr. lb.

3d, 1 13 3 12 by 27 = 9×3

5 1 2 8
9

45 14 — 16

L. 1288 15 — = 75 times
lb 3 3 9

4th, 3 5 2 2 by 54 = 9×6

31 — — —
6

186 — — —

Note 1st, Although the component parts will answer in any order, it is best, when it can be done, to take them in such order as may clear off some of the lower places at the first multiplication, as is done in Ex. 2d, and 4th.

Note 2d, The operation may be proved, by taking the component parts in a different order, or dividing the multiplier in a different manner.

1st, L. 72 3 9 by 63

6th, 13 C. 3 q. 13 lb. by 48

2d, 1753 12 2 by 54

7th, 5 lb. 3 3. 53. 2 9. 4 gr. by 28

3d, 868 2 6 by 48

8th, 5 acres 3 r. 2 f. 13 ells by 72

4th, 421 7 9 by 125

9th, 5 chald. 2 f. 3 p. by 84

5th, 17 17 7 1/4 by 49

10th, 5 m. 3 f. 17 p. 2 y. by 56

§ 34. RULE III. *If the multiplier be a prime number, multiply first by the composite number next lower, then by the difference, and add the products.*

L. 35 17 9 by 67 = $64 + 3$
8 64 = 8×8

L. 287 2 — = 8 times.
8

L. 2296 16 — = 64 times.
107 13 3 = 3 times.

L. 2404 9 3 = 67 times.

Here, because 8 times 8 is 64, we multiply twice by 8, which gives L. 2296 : 16s. equal to 64 times the multiplicand; then we find the amount of 3 times the multiplicand, which is L. 107 : 13 : 3; and it is evident that these added, amount to 67 times the multiplicand.

1st,

1st, L. 135	7	2	by 57	6th, 15 cwt. 3 q. 9 lb.	by 67
2d, 732	9	5	by 34	7th, 12 acres, 3 r. 25 p.	by 85
3d, 738	3	9½	by 67	8th, 1 boll 2 f. 3 p.	by 55
4th, 3748	2	3	by 82	9th, 1 lb. 8 oz. 7 dr. aver.	by 26
5th, 299	19	9¼	by 75	10th, 3 yards, 1 f. 7 in.	by 38

§ 35. RULE IV. *If there be a composite number a little above the multiplier, we may multiply by that number, and by the difference, and subtract the latter product from the former.*

L. 17 4 5 by 106=108—2 Here we multiply by 12 and
 12 108= 9×12 9, the component parts of 108,
 ————— and obtain a product of L. 1859,
 L. 206 13 — 178. equal to 108 times the mul-
 9 tiplicand; and, as this is twice
 ————— oftener than was required, we
 L. 1859 17 — = 108 times subtract twice the multiplicand,
 34 8 10 = 2 times and the remainder is the num-
 ————— ber sought.

L. 1825 8 2 = 106 times

1st, L. 73	15	8	by 83	4th, 17 C. 1 q. 17 lb.	by 62
2d, 654	3	8½	by 79	5th, 10 acres, 2 r. 15 f. 18 e.	by 94
3d, 236	12	7	by 47	6th, 3 qrs. 3 bush. 4 g.	by 53

§ 36. RULE V. *If the multiplier be large, multiply by 10, and multiply the product again by 10; by which means you obtain an hundred times the given number. If the multiplier exceed 1000, multiply by 10 again; and continue this operation farther if the multiplier require it; then multiply the given number by the unit-place of the multiplier; the first product by the ten-place, the second product by the hundred-place; and so on. Add the products thus obtained together.*

Example, L. 34 8 2½ by 3465.

L. 34 8 2½ by 5 = L. 172 1 ½ = 5 times
 10

10 times L. 344 2 1 by 6 = 2064 12 6 = 60 times
 10

100 times L. 3441 — 10 by 4 = 13764 3 4 = 400 times
 10

1000 times L. 34410 8 4 by 3 = 103231 5 — = 3000 times

L. 119232 1 10½ = 3465 times

1st, L. 1762	3	9	by 728	4th, 3 qr. 18 lb. averd.	by 7865
2d, 173	6	8	by 4572	5th, 3 a. 36 f. 21 e.	by 342134
3d, 132	5	8½	by 37892	6th, 3 dwt. 5 gr. Troy	by 5555

§ 37. The use of multiplication is to compute the amount of any number of equal articles, either in respect of measure, weight, value, or any other consideration. The multiplicand expresses how much is to be reckoned for each article; and the multiplier expresses how many articles to be reckoned for. As the multiplier points out the number of articles to be added, it is always an abstract number, and has no reference to any value or measure whatever. We shall mention the most common instances in which the practice of this operation is required.

1st, To find the amount of any number of parcels; multiply the quantity in each parcel by the number whose amount is required.

2d, To find the value of any number of articles; multiply the price of a single article by the number.

3d, To find the weight or measure of a number of articles; multiply the weight or measure of a single article by the number.

4th, To find the amount of work done, interest incurred, provisions consumed, or any thing else, which increases by length of time; multiply the given rate per day, month, or year, by the number of days, months, or years.

5th, To find the measure of a rectangular surface; multiply the length by the breadth. To illustrate this, we may conceive a floor paved with stones, each a foot square, there will be as many stones in each row as there are feet in length, and as many rows as there are feet in breadth.

6th, To find the measure of a rectangular solid; multiply the superficial measure of the base, or foundation, by the height. If we suppose a wall built of stones, measuring each a solid foot, it is obvious that the whole number of stones is found, by multiplying the number in each flat by the number of flats.

7th, To find how many of any lower denomination are contained in a given number of a higher; multiply by the value of the higher: It is obvious that any number of pounds contain twenty times as many shillings; and the like in other cases.

§ 38. This computation, for changing any sum of money, weight, or measure, into a different kind, is called REDUCTION. When the given quantity is expressed in different denominations, we reduce the highest to the next lower, and add to the product the given number of that denomination; and proceed in like manner till we have reduced it to the lowest denomination.

Example.

Example. To reduce L. 46 : 13 : 8½ to farthings.

L. 46

20

920 shillings in L. 46

13

933 shillings in L. 46 13

12

11196 pence in L. 46 13

8

11204 pence in L. 46 13 8

4

44816 farthings in L. 46 13 8

3

44819 farthings in L. 46 13 8½

Or thus:

L. 46 13 8½

20

933

12

11204

4

44819

It is easy to take in, or add the higher denomination at the same time we multiply the lower.

Questions for Practice.

1. How many balls in 18 boxes, containing each 365?
2. How many men in an army drawn up in 3 lines, 5 ranks in each line, and 999 men in each rank?
3. How many grains wheat in a field drilled in 243 rows, each 745 feet long, 3 stocks in each foot, 5 ears from each stock, and 17 grains from each ear?
4. How much hay will grow on 425 acres, supposing two crops, the first 212 stones, and the second 70 stones per acre, distinguishing the crops?
5. How many balls must be provided for a fleet consisting of 6 ships of 74 guns, 3 of 50 guns, 2 of 26 guns, and 5 of 24 guns, to supply them with 99 rounds of shot?
6. What is the value of 8 pieces cloth, at L. 5 : 17 : 8 per piece?
7. ——— Of 48 bolls wheat, at 16 sh. 8 d. per boll?
8. ——— Of 72 bags cotton, at L. 17 : 14 : 8 per bag?
9. ——— Of 34 pieces silk, at L. 9 : 18 : 8 per piece?
10. ——— Of 209 cattle, at L. 4 : 13 : 6 each?
11. ——— Of 23 hds. wine, at L. 15 : 14 : 9 per hd?
12. ——— Of 758 qrs. barley, at L. 1 : 3 : 5 per qr.?
13. What is the weight of 27 hds. wg. 13 cwt. 2 q. 24 lb. each?
14. ——— Of 22 hds. wg. 13 cwt. 3 q. 4 lb. each?
15. ——— Of 365 hds. wg. 14 cwt. 2 q. 19 lb. each?
16. ——— Of 3456 hds. wg. 14 cwt. 3 q. 22 lb. each?
17. ——— Of 437 hds. wg. 3 cwt. 2 q. 10 lb. each?

18. What is the gross tare and nett weight of 12 hds. weighing each 5 cwt. 2 qr. 15 lb. tare 1 qr. 12 lb. per hd.
19. What is the weight of 1250 guineas, at 5 dwt. 6 gr. each?
20. — Of 6 bolls victual, at 8 lb. 12 oz. averd. per peck?
21. How much ditching will a man make in 36 days, at the rate of 2 poles 1 yard 2 feet 9 inches per day?
22. If the interest of the national debt be 2s. 10d. each second of time, how much does it amount to in an year?
23. How many square feet in an area 215 feet long and 148 broad?
24. How many square feet in the floor, walls, and roof of a room 16 feet long, 14 broad, and 11 high?
25. How many solid feet within the same room?
26. How many solid feet in a block marble 5 feet long, 3 broad, and 2 thick?
- ¶ 27. How many staves in 368 barrels of 25 staves each?
28. How many bottles wine from 15 pipes running 53 doz. 7 bottles each?
29. How many herrings will be caught by 12 fishing boats, each employing 5 nets for 24 days, drawing 17 times a-day, and catching, at an average, 25 herrings each draught?
30. How many feeds will be produced from one plant, which bears 15 stalks, each stalk 12 flowers, and each flower 48 seeds?
31. How many letters in a book of 7 volumes, each volume 328 pages, each page 34 lines, and each line 36 letters?
32. What is the value of 9 hogsheds wine, at L. 25 : 1 : 9?
33. — Of 12 acres ground, at L. 25 : 3 : 9?
34. — Of 36 bolls wheat, at 17s. 6d.?
35. — Of 72 yards cloth, at 19s. 4d.?
36. — Of 17 bales wool, at L. 4 : 18 : 9?
37. — Of 625 cattle, at L. 3 : 12 : 4?
38. — Of 148 yards cloth, at L. 1 : 1 : 6?
39. — Of 28735 qrs. corn, at L. 1 : 13 : 4½?
40. — Of 2758 yards linen, at 4s. 6½d.?
41. What is the weight of 7 hds. at 3 cwt. 2 q. 12 lb. each?
42. — Of 24 ditto, at 7 cwt. 2 q. 2 lb.?
43. — Of 37 ditto, at 9 cwt. 3 q. 3 lb.?
44. — Of 119 ditto, at 3 cwt. 2 q. 15 lb.?
45. — Of 17½ qrs. corn, at 2 cwt. 3 q. 2 lb.?
46. — Of 444 bars iron, at 19 lb.?
47. How much corn will 36 men thresh in 45 days, at 5 bushels 3 gallons each man per day?
48. How much ground will 7 yoke of oxen plow in 38 days, at 2 rood 14 perches each yoke per day?
49. How many square yards in an area 380 yards long and 250 broad?
50. What is the value of a carpet 6 yards long and 5 broad, at 5s. per yard?

51. How many solid feet in a piece of timber 12 feet long, 3 broad, and 2 thick?

¶ 52. How much corn will grow on 64 acres, at 3 bolls 5 pecks per acre? and what is the value at 15s. per boll, and the weight at 1 cwt. 2 qr. 12 lb. per boll?

53. What is the pay of 8 companies of 75 men each for 7 months, at 8s. 6d. each man per months?

54. What is the value of an area 18 yards long and 15 broad, at 7s. 9d. per square yard?

55. What is the value of 13 boxes candle, wt. each 18 lb. at 9½d. per lb.?

56. If a man thresh four threaves corn in a day, and each threave yield 5 pecks, and each peck weigh 8 lb. what quantity and weight will 15 men thresh in 45 days?

¶ 57. How many pence in L. 1858 : 17 : 4?

58. How many farthings in L. 379 : 12 : 9¼?

59. How many in L. 5796384 : 5 : 5¼?

60. How many lb. in 14 tons 16 cwt. 2 qr. 25 lb.?

61. How many grains in 3 lb. 6 oz. 14 dwt. 16 gr.?

62. How many grains in 6 lb. 7 ¾. 3 ¾. 2 ¾. 18 gr.?

63. How many ells in 18 Scots acres 3 roods 12 falls 22 ells?

64. How many yards in 15 English acres 2 roods 18 polls 30 yards?

65. How many pounds Scots * in L. 479027 : 8 : 4 Sterling?

66. How many merks Scots in L. 525 Sterling?

¶ 67. How many pence in L. 45783 : 16 : 2?

68. How many farthings in L. 9999 : 19 : 11¼?

69. How many grains in 14 lb. 7 oz. 13 dwt. 18 gr.?

70. How many inches in 3 miles 4 furlongs 2 poles 3 yards?

71. How many drams in 3 cwt. 2 qr. 12 lb. 7 oz. 5 d. averd.?

72. How many lippies in 5 chalders 3 bolls 2 pecks?

73. How many seconds in 365 days 5 hours 48 minutes?

74. How many pints in 37 quarters 5 bushels?

75. How many pounds Scots in L. 174 : 3 : 4 Sterling?

76. How many merks Scots in L. 1572-Sterling?

77. How many sixpences in 125 guineas?

§ 40. For further practice, the learner may compose tables in the following form from those given in § 13. for exhibiting the number of each lower denomination contained in one of the higher.

Sterling-money.				Averdupois Weight.			
Far.	d.	s.	L.	oz.	lb.	Cwt.	Ton.
4 =	1			16 =	1		
48 =	12 =	1		448 =	28 =	1	
960 =	240 =	20 =	1	1792 =	112 =	4 =	1
				35840 =	2240 =	80 =	20 =

APPENDIX

* There are 12 pounds Scots, and 18 merks Scots, in a pound Sterling.

APPENDIX to Chapter IV.

MENSURATION.

§ 41. THE general principle of computation in mensuration was mentioned § 37. 5th and 6th. It may be proper to illustrate the method of applying it at greater length.

Mensuration is of three kinds; lineal, superficial, and solid. In lineal mensuration, the length or extent in one direction is the only thing attended to; and this is understood when we inquire the distance of a city, the length of a street, the height of a mountain, or the depth of a well. Superficial measure respects breadth as well as length; and is understood when we inquire the extent of a field, the size of a window or a picture. Solid measure respects length, breadth, and thickness; and is understood when we inquire the size of a plank or stone, or the capacity of a cistern.

Lineal measures are taken by applying a rod, ruler, or line, of a known length. Superficial and solid measures are computed from the lineal ones.

SECTION I. SUPERFICIAL MEASURE.

§ 42. LINEAL measure is commonly taken in feet, inches, and parts, or lines of $\frac{1}{12}$ of an inch. A superficial foot is either a square, which measures a foot in length and a foot in breadth, or a space of equal extent in any form; for example, two feet in length, and six inches in breadth. A square foot may be divided by lines drawn in one direction into 12 parts, each a foot long and an inch broad, and these may be divided by cross lines, each into 12, or altogether into 144 square inches. In like manner, a square yard may be divided into 9 square feet; and, in general, if we multiply the lineal value of any measure into itself, the product shows the superficial value.

If the length be given in feet only, the superficial measure is obtained at once by multiplication. It remains to explain the method of proceeding with the lower denominations.

§ 43. The twelfth part of a superficial foot is termed by artificers, though improperly, an inch, and is divided into 12 parts, each part into 12 seconds, and so on. Hence it is evident, that if a foot in length be multiplied by a foot, an inch, or a part in breadth, the product must be a foot, an inch, or a part of superficial measure; but if an inch of length be thus multiplied, the product will be 12 times less than that of a foot; and if a part be thus multiplied, the product will be 12 times less than that of an inch: From which we may infer the following practical rule.

Multiply each denomination of the length by the feet of breadth, and place each product under the denomination of the multiplicand from which it arises, carrying when necessary by 12 to the higher place; then multiply by the inches, and set each product one place nearer to the right hand; lastly, multiply by the parts, and set each product another place towards the right hand.

	F.	In.	
Ex. 1. length	7	3	
breadth	5	9	
	36	3	
	5	5	3
surface	41	8	3

	F.	In.	P.
Ex. 3. length	73	9	2
breadth	28	3	
	2065	4	8
	18	5	3 6
surface	2083	9	11 6

	F.	In.	P.
Ex. 2. length	8	4	11
breadth	3	2	9
	25	2	9
	1	4	9 10
		6	3 8 3
surface	27	1	10 6 3

	F.	In.	P.
Ex. 4. length	0	4	7
breadth	0	2	3
	0	0	9 2
			1 1 9
surface	0	0	10 3 9

In Ex. 3. we must multiply the lower denominations by 28 separately, and divide the product by 12, to discover the carriage and remainder: In like manner, we multiply 73 by 3, and divide the product by 12.

In Ex. 4. there are no feet, and the lower places are regulated accordingly.

§ 44. The value of the different places may be inferred from the foregoing examples. They consist of spaces equal in extent, though frequently differ in form, as under.

1. *Feet*, Square feet, or spaces, 12 feet long and an inch broad.
2. *Inches*, Spaces, a foot long and an inch broad, or 12 feet long and a part broad.
3. *Parts*, Square inches, or spaces, a foot long and a part broad.
4. *Seconds*, Spaces, an inch long and a part broad.
5. *Thirds*, Square parts.

The method we have been explaining is generally used by artificers, and termed cros multiplication, or, more properly, duodecimal multiplication. The operation is the same in effect as if the arithmetical scale were regulated by 12 instead of 10, and characters for 10 and 11 added to the number of the digits. If the price of the surfaces measured is required, it will be convenient to follow the

the same scale, and divide a penny into 12 parts, and these again, if necessary, into 12 smaller parts.

§ 45. We shall work the first example by several other methods, that the learner may judge which is preferable.

Decimally,

F. In.

$$7\ 3 = 7.25$$

$$5\ 9 = 5.75$$

$$\begin{array}{r} 3625 \\ 5075 \\ \hline 3625 \end{array}$$

$$5075$$

$$3625$$

$$\begin{array}{r} 41.6875 \\ 12 \end{array}$$

$$12$$

$$\begin{array}{r} 8.2500 \\ 12 \end{array}$$

$$12$$

$$\begin{array}{r} 3.0000 \end{array}$$

by reduction,

F. In. In.

$$7\ 3 = 87$$

$$5\ 9 = 69$$

$$783$$

$$522$$

$$12(6003$$

$$12(500 \text{ rem. } 3$$

$$41 \text{ rem. } 8$$

by aliquot parts,

F. In.

$$7\ 3$$

$$5\ 9$$

$$5 \text{ Feet, } 36\ 3$$

$$6 \text{ Inches, } 3\ 7\ 6$$

$$3 \text{ Inches, } 1\ 9\ 9$$

$$41.8.3$$

§ 46. If the measure be required in yards, or any other denomination greater than feet, we may first find it in feet, and then reduce them to the denomination required.

Ex. What are the contents of an area 6 yards, 2 feet, 6 inches long, and 4 yards 2 feet broad?

F. In.

Length reduced, 20 6

Breadth reduced, 14

Here we divide the superficial feet by 9, which quotes the superficial yards.

$$9)287(31 \text{ yards, } 8 \text{ feet,}$$

§ 47. Questions of this kind may also be wrought by multiplying each part of the length into each part of the breadth, provided we attend to the value of the products, and reduce them when necessary. Thus,

Yds. F. In.

$$6\ 2\ 6$$

$$4\ 2$$

$$24\ 4$$

$$6\ 6$$

$$7$$

$$31\ 8$$

$$4 \text{ yds. } \times 2 \text{ feet} = 8$$

$$6 \text{ yds. } \times 2 \text{ feet} = 12$$

$$3)20(6 \text{ yds.}$$

$$18$$

$$2 \times 3 = 6 \text{ feet}$$

$$4 \text{ yds. } \times 6 \text{ in.} = 24$$

$$3$$

$$72$$

$$2 \text{ feet } \times 6 \text{ in.} = 12$$

$$12)84(7$$

Here, because any lineal denomination, multiplied into itself, produces squares of the same, we first multiply the yards by the yards, and

and the feet by the feet. Then we multiply the yards in each factor by the feet in the other factor; and these products added, amount to 20, being so many oblongs, each a yard long and a foot broad: This, divided by 3, gives square yards, and the remainder, multiplied by 3, gives square feet. Then we multiply 4 yards into 6 inches, which gives 24 oblongs, a yard long, and an inch broad, or 72 oblongs, of a foot by an inch; which, added to 12, the product of 2 feet by 6 inches, makes 84 such oblongs, or 7 square feet.

§ 48. In general, like denominations multiplied by like, produce squares of the same; and the product of unlike denominations, divided by the value of the greater, quotes squares of the greater; and the remainder, multiplied by the same value, quotes squares of the lesser.

Required the contents of the following surfaces?

<i>Length.</i>			<i>Breadth.</i>			<i>Length.</i>			<i>Breadth.</i>		
<i>F.</i>	<i>In.</i>	<i>Pts.</i>	<i>F.</i>	<i>In.</i>	<i>Pts.</i>	<i>F.</i>	<i>In.</i>	<i>Pts.</i>	<i>F.</i>	<i>In.</i>	<i>Pts.</i>
1.	32	7 —	12	5 —		5.	25	7 —	18	4 —	
2.	25	9 —	18	10 —		6.	19	9 —	12	11 —	
3.	17	4 2	9	3 —		7.	125	2 3	—	9	4
4.	125	7 6	1	2 9		8.	—	3 7	—	2	5

9. What is the measure of an area 12 yards 1 foot long, 7 yards 2 feet broad?

10. ——— of a garden 45 yards 2 feet long, $36\frac{1}{2}$ yards broad?

11. ——— of a carpet 7 yards, 1 foot 4 inches long, and 5 yards, 2 feet 3 inches broad?

12. ——— of 12 windows 5 feet 3 inches long, and 2 feet 11 inches broad?

13. ——— of a floor 13 yards, 2 feet 9 inches long, and 5 yards, 1 foot 7 inches broad?

14. How many square yards in the area of Solomon's temple, whose dimensions are mentioned in I. KINGS, chap. VI. reckoning the cubit equal to a foot and a half?

SECTION II. SOLID MEASURE.

§ 49. BECAUSE a square foot contains 144 square inches, it may be covered with a like number of dice, each an inch square, and an inch high. If these be covered with others till the heap be raised a foot high, it becomes a cubical or solid foot, and contains 12 times 144, or 1728 dice, or a like number of solid inches. A solid yard contains 27 solid feet; and, in general, if the lineal value of any measure be multiplied twice into itself, the last product is its solid value.

§ 50. Solid feet are divided like superficial ones, by artificers, into inches, and smaller parts, decreasing by a regular gradation of 12.

the same scale, and divide a penny into 12 parts, and these again, if necessary, into 12 smaller parts.

§ 45. We shall work the first example by several other methods, that the learner may judge which is preferable.

Decimally,

F. In.

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$$12(6003$$

$$12(500 \text{ rem. } 3$$

$$41 \text{ rem. } 8$$

by aliquot parts,

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$$7\ 3$$

$$5\ 9$$

$$5 \text{ Feet, } 36\ 3$$

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$$3 \text{ Inches, } 1\ 9\ 9$$

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F. In.

Length reduced, 20 6

Breadth reduced, 14

Here we divide the superficial feet by 9, which quotes the superficial yards.

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§ 47. Questions of this kind may also be wrought by multiplying each part of the length into each part of the breadth, provided we attend to the value of the products, and reduce them when necessary. Thus,

Yds. F. In.

$$6\ 2\ 6$$

$$4\ 2$$

$$24\ 4$$

$$6\ 6$$

$$7$$

$$31\ 8$$

$$4 \text{ yds. } \times 2 \text{ feet} = 8$$

$$6 \text{ yds. } \times 2 \text{ feet} = 12$$

$$3)20(6 \text{ yds.}$$

$$18$$

$$2 \times 3 = 6 \text{ feet}$$

$$4 \text{ yds. } \times 6 \text{ in.} = 24$$

$$3$$

$$72$$

$$2 \text{ feet } \times 6 \text{ in.} = 12$$

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Here, because any lineal denomination, multiplied into itself, produces squares of the same, we first multiply the yards by the yards, and

and the feet by the feet. Then we multiply the yards in each factor by the feet in the other factor; and these products added, amount to 20, being so many oblongs, each a yard long and a foot broad: This, divided by 3, gives square yards, and the remainder, multiplied by 3, gives square feet. Then we multiply 4 yards into 6 inches, which gives 24 oblongs, a yard long, and an inch broad, or 72 oblongs, of a foot by an inch; which, added to 12, the product of 2 feet by 6 inches, makes 84 such oblongs, or 7 square feet.

§ 48. In general, like denominations multiplied by like, produce squares of the same; and the product of unlike denominations, divided by the value of the greater, quotes squares of the greater; and the remainder, multiplied by the same value, quotes squares of the lesser.

Required the contents of the following surfaces?

<i>Length.</i>			<i>Breadth.</i>			<i>Length.</i>			<i>Breadth.</i>		
<i>F.</i>	<i>In.</i>	<i>Pts.</i>	<i>F.</i>	<i>In.</i>	<i>Pts.</i>	<i>F.</i>	<i>In.</i>	<i>Pts.</i>	<i>F.</i>	<i>In.</i>	<i>Pts.</i>
1.	32	7 —	12	5 —		5.	25	7 —	18	4 —	
2.	25	9 —	18	10 —		6.	19	9 —	12	11 —	
3.	17	4 2	9	3 —		7.	125	2 3	—	9	4
4.	125	7 6	1	2 9		8.	—	3 7	—	2	5

9. What is the measure of an area 12 yards 1 foot long, 7 yards 2 feet broad?

10. ——— of a garden 45 yards 2 feet long, $36\frac{1}{2}$ yards broad?

11. ——— of a carpet 7 yards, 1 foot 4 inches long, and 5 yards, 2 feet 3 inches broad?

12. ——— of 12 windows 5 feet 3 inches long, and 2 feet 11 inches broad?

13. ——— of a floor 13 yards, 2 feet 9 inches long, and 5 yards, 1 foot 7 inches broad?

14. How many square yards in the area of Solomon's temple; whose dimensions are mentioned in I. KINGS, chap. VI. reckoning the cubit equal to a foot and a half?

SECTION II. SOLID MEASURE.

§ 49. BECAUSE a square foot contains 144 square inches, it may be covered with a like number of dice, each an inch square, and an inch high. If these be covered with others till the heap be raised a foot high, it becomes a cubical or solid foot, and contains 12 times 144, or 1728 dice, or a like number of solid inches. A solid yard contains 27 solid feet; and, in general, if the lineal value of any measure be multiplied twice into itself, the last product is its solid value.

§ 50. Solid feet are divided like superficial ones, by artificers, into inches, and smaller parts, decreasing by a regular gradation of 12.

Therefore, if the height be a foot, the solid measure is of the same denomination as the superficial; but, if the height be an inch, the solid measure is one place lower than the superficial; and, if the height be a part, the solid measure is two places lower. The computation of solid measure may, therefore, be performed like superficial, by duodecimal multiplication.

Ex. Required the solid contents of a wall, 13 feet 6 inches long; 5 feet 8 inches high; and 2 feet 7 inches broad?

By duodecimals.

	F.	In.
Length	13	6
Height	5	8
	67	6
	9	
Surface	76	6
Breadth	2	7
	153	
	44	7 6
Solid contents	197	7 6

By aliquot parts.

	F.	In.
	13	6
		5
	67	6
4 inches	4	6
4 inches	4	6
	76	6
		2
	153	
6 inches	38	3
1 inch	6	4 6
	197	7 6

If the dimensions be taken in feet, inches, and parts, the last product may contain 6 places under feet, in the duodecimal scale. The form of the spaces may be collected from the factors, as in § 43. 44.

§ 51. Measures given in yards and feet, or in any other denomination, may be reduced to the lowest denomination; and the solid contents being found in that denomination, may be reduced again to higher ones.

Ex. What is the contents of a cistern, 9 yards 2 feet long, 6 yards 2 feet broad, and 4 yards 2 feet deep?

	Y.	F.	F.	
Length	9	2	or	29
Breadth	6	2	or	20
Surface				580
Depth	4	2		14
				2320
				58
Contents				27)8120 feet
				300 yards 20 feet

Here we find the solid contents 8120 feet, which we divide by 27, the number of solid feet in a solid yard.

§ 52. This question may also be wrought by multiplying each term of the factors together, and attending to the value of the factors. Thus,

	Yds. F.			
Length	9	2	64 yds.	4
Breadth	6	2	2 feet	4
9 yds. $\times$ 2 feet = 18	54	4	3) 128 (42	9) 16 (1 yd.
6 $\times$ 2 = 12			12	9
3) 30 (	10			
			08	7 $\times$ 3 = 21 feet
Surface	64	4	6	
Depth	4	2		
			2 $\times$ 9 = 18 feet	
	256	8		
64 yds. $\times$ 2 feet	42	18		
4 feet $\times$ 4 yds.	1	21		
Contents	300	20		

Here the superficial contents of the base of the cistern is found 64 square yards and 4 square feet, by the method explained § 47; and, it is required to multiply this by 4 yards and 2 feet, the depth. It is obvious, that 64 superficial yards, multiplied into 4 yards of depth, give 256 solid yards; and 4 superficial feet, multiplied into 2 feet of depth, give 8 solid feet. We have next to multiply 64 superficial yards by 2 feet of depth, which gives 128 spaces, a yard square and a foot deep; and, since three of these make a solid yard, and each of them contains 9 solid feet, we divide the product 128 by 3, which quotes 42 solid yards, and multiply the remainder 2 by 9, which gives 18 solid feet. Lastly, we multiply 4 superficial feet by 4 yards of depth, and this produces 16 spaces, each a foot square and a yard high. It requires 9 of these to make a solid yard, and each of them contains 3 solid feet; therefore we divide the product 16 by 9, which quotes 1 solid yard, and multiply the remainder 7 by 3, which gives 21 solid feet. In adding the solid feet, we carry by 27 to the yards.

§ 53. In general, if the superficial and lineal measure be of the same denomination, the product is a solid of the same. If the superficial measure be of a higher denomination, the product, divided by the value of the same, quotes solids of the greater; and the remainder, multiplied by the square of that value, produces solids of the lesser. If the lineal measure be of a higher denomination, the product, divided by the square of its value, quotes solids of the greater, and the remainder, multiplied by the value, produces solids of the lesser.

1. Required the solid contents of a wall 74 feet 6 inches long, 2 feet 9 inches broad, and 24 feet 3 inches high?
2. ——— of a wall 135 feet long, 4 feet 9 inches high, and 1 foot 10 inches broad?
3. Required the solid contents of a rampart 154 fathoms 2 feet long, 6 fathoms 4 feet broad, and 3 fathoms 5 feet high?
4. ——— of a box 5 feet 2 inches long, 3 feet 5 inches broad, and 2 feet 8 inches 5 parts deep?
5. ——— of a casket 8 inches 3 parts long, 6 inches 2 parts broad, and 5 inches 4 parts deep?
6. ——— of a block marble 4 feet 3 inches long, 2 feet 6 inches broad, and 2 feet 1 inch 5 parts high?
7. Required the cavity of a pond 76 yards 2 feet long, 35 yards broad, and 3 yards 9 inches deep?
8. The canal, which joins the Forth and Clyde, is 27 miles long, 36 feet broad, one place with another, and 7 feet deep; required the number of yards of excavation?
9. The length of Noah's ark was 300 cubits, the breadth 50, and height 30; how many yards did it contain? and how many horses might have been lodged in it, allowing 10 yards for each horse?

CHAP. V.

DIVISION.

§54. **I**N division, two numbers are given; and it is required to find how often the former contains the latter. Thus, it may be asked how often 21 contains 7, and the answer is exactly 3 times. The former given number (21) is called the **DIVIDEND**; the latter (7) the **DIVISOR**; and the number required (3) the **QUOTIENT**. It frequently happens that the division cannot be completed exactly without fractions. Thus it may be asked, how often 8 is contained in 19? the answer is twice, and a remainder of 3.

§55. This operation consists in subtracting the divisor from the dividend, and again from the remainder, as often as it can be done, and reckoning the number of subtractions; as

21
7 first subtraction

—

14
7 second subtraction

—

7
7 third subtraction.

—

0

19

8 first subtraction

—

11
8 second subtraction

—

3 remainder.

As this operation, performed at large, would be very tedious, when the quotient is a high number, it is proper to shorten it by every convenient method; and, for this purpose, we may multiply the divisor by any number whose product is not greater than the dividend, and so subtract it twice or thrice, or oftener, at the same time. The best way is to multiply it by the greatest number that does not raise the product too high, and that number is also the quotient. For example, to divide 45 by 7, we inquire what is the greatest multiplier for 7 that does not give a product above 45; and we shall find that it is 6; and 6 times 7 is 42, which, subtracted from 45, leaves a remainder of 3. Therefore 7 may be subtracted 6 times from 45; or, which is the same thing, 45, divided by 7, gives a quotient of 6, and a remainder of 3.

If the divisor do not exceed 12, we readily find the highest multiplier that can be used from the multiplication table. If it exceed 12, we may try any multiplier that we think will answer. If the product be greater than the dividend, the multiplier is too great; and, if the remainder, after the product is subtracted from the dividend, be greater than the divisor, the multiplier is too small. In either of these cases, we must try another. But the attentive learner, after some practice, will generally hit on the right multiplier at first.

If the divisor be contained oftener than ten times in the dividend, the operation requires as many steps as there are figures in the quotient. For instance, if the quotient be greater than 100, but less than 1000, it requires 3 steps. We first inquire how many hundred times the divisor is contained in the dividend, and subtract the amount of these hundreds. Then we inquire how often it is contained ten times in the remainder, and subtract the amount of these tens. Lastly, we inquire how many single times it is contained in the remainder. The method of proceeding will appear from the following example:

$$\begin{array}{rcl}
 & \text{To divide } 5936 \text{ by } 8. & \\
 \text{From } & 5936 & \\
 \text{Take } & 5600 = 700 \text{ times } 8 & \\
 \hline
 & \text{Rem. } 336 & \\
 \text{From which take } & 320 = 40 \text{ times } 8 & \\
 \hline
 & \text{Rem. } 16 & \\
 \text{From which take } & 16 = 2 \text{ times } 8 & \\
 \hline
 & 0 & 742 \text{ times } 8 \text{ in all.}
 \end{array}$$

It is obvious, that as often as 8 is contained in 59, so many hundred times it will be contained in 5900, or in 5936; and, as often as it is contained in 33, so many ten times it will be contained in 330, or in 336; and thus the higher places of the quotient will be obtained

obtained with equal ease as the lower. The operation might be performed by subtracting 8 continually from the dividend, which will lead to the same conclusion by a very tedious process. After 700 subtractions, the remainder would be 336; after 40 more, it would be 16; and, after 2 more, the dividend would be entirely exhausted. In practice, we omit the cyphers, and proceed by the following.

§ 56. RULE. 1st, Assume as many figures on the left-hand of the multiplier as contain the divisor once or oftener; find how many times they contain it; and place the answer as the highest figure of the quotient.

2d, Multiply the divisor by the figure you have found, and place the product under the part of the dividend from which it is obtained.

3d, Subtract the product from the figures above it.

4th, Bring down the next figure of the dividend to the remainder, and divide the number it makes up, as before.

Examples.

1st. $8(5936(742$ 2d. $63)30114(478$ 3d. $365)974932(2671\frac{17}{365}$

<u>56..</u>	<u>252..</u>	<u>730...</u>
33	491	2449
32	441	2190
<u>16</u>	<u>504</u>	<u>2593</u>
16	504	2555
<u>0</u>	<u>0</u>	<u>382</u>
		365

Remainder 17

The numbers which we divide, as 59, 33, and 16, in the first example, are called *dividuals*.

It is usual to mark a point under the figures of the dividend, as they are brought down, to prevent mistakes.

If there be a remainder, the division is completed by a vulgar fraction, whose numerator is the remainder, and its denominator the divisor. Thus, in Ex. 3. the quotient is 2671, and remainder 17; and the quotient completed is $2671\frac{17}{365}$.

1st,	589424 by 374	7th,	975402 by 1338
2d,	74879 by 563	8th,	8649684 by 873
3d,	832551 by 97	9th,	859401 by 8657
4th,	378315 by 35	10th,	54321684 by 610356
5th,	759842 by 373	11th,	6753412 by 6634
6th,	97998594 by 648	12th,	73954275 by 709

§ 57. A number which divides another without a remainder is said to measure it; and the several numbers which measure another, are called its aliquot parts. Thus, 2, 4, 6, 8, and 12, are aliquot parts of 24. As it is often useful to discover numbers which measure others, we may observe,

1st, Every number ending with an even figure, that is, with 2, 4, 6, 8, or 0, is measured by 2.

2d, Every number ending with 5 or 0, is measured by 5.

3d, Every number, whose figures, when added, amount to an even number of 3's or 9's, is measured by 3 or 9, respectively.

Contractions and Varieties in division.

§ 58. First, When the divisor does not exceed 12, the whole computation may be performed without setting down any figures except the quotient.

$$\text{Ex. } 7 \overline{)35868(5124} \quad \text{or} \quad 7 \overline{)35868} \\ 5124$$

§ 59. Secondly, When the divisor is a composite number, and one of the component parts also measures the dividend, we may divide successively by the component parts.

$$\text{Ex. 1st. } 30114 \text{ by } 63. \quad \text{Ex. 2d. } 975 \text{ by } 105 = 5 \times 7 \times 3. \\ \begin{array}{r} 9 \overline{)30114} \\ 7 \overline{)3346} \\ \text{Quotient } 478 \end{array} \quad \begin{array}{r} 5 \overline{)975} \\ 3 \overline{)195} \\ 7 \overline{)65} \\ \text{Quotient } 93 \end{array} \quad \begin{array}{l} \text{1st, } 24984 \text{ by } 72 \\ \text{2d, } 9375 \text{ by } 45 \\ \text{3d, } 1764 \text{ by } 48 \\ \text{4th, } 3699 \text{ by } 81 \\ \text{5th, } 1071 \text{ by } 126 \end{array}$$

This method might be also used, although the component parts of the divisor do not measure the dividend; but the learner will not understand how to manage the remainder till he be acquainted with the doctrine of vulgar fractions.

§ 60. Thirdly, When there are cyphers annexed to the divisor, cut them off, and cut off an equal number of figures from the dividend; annex these figures to the remainder.

$$\text{Ex. To divide } 378643 \text{ by } 5200. \\ \begin{array}{r} 52 \overline{)00378643(72\frac{4}{5}\frac{4}{5}\frac{4}{5}} \\ \underline{364} \\ 146 \\ \underline{104} \\ 4243 \end{array} \quad \begin{array}{l} \text{1st, } 37968 \text{ by } 460 \\ \text{2d, } 45397 \text{ by } 2800 \\ \text{3d, } 73825 \text{ by } 9000 \\ \text{4th, } 86295 \text{ by } 7300 \end{array}$$

The reason will appear, by performing the operation at large, and comparing the steps.

To divide by 10, 100, 1000, or the like. Cut off as many figures, on the right hand of the dividend, as there are cyphers in the divi-

for. The figures which remain on the left hand compose the quotient, and the figures cut off compose the remainder.

§ 61. Fourthly, We may make a table of the products of the divisor, multiplied by the 9 digits, in order to discover more readily how often it is contained in each dividural. This is convenient when the dividend is very long, or, when it is required to divide frequently by the same divisor.

73 by 2 = 146	73)53872694(737982	
3 = 219	511.....	716
4 = 292		657
5 = 365	277	
6 = 438	219	599
7 = 511		584
8 = 584	582	
9 = 657	511	154
		146
	716	
		8 rem.

§ 62. Fifthly, To divide by 9, 99, 999, or any number of 9's, transcribe under the dividend part of the same, shifting the highest figure as many places to the right hand as there are 9's in the divisor. Transcribe it again, with the like change of place, as often as the length of the dividend admits; add these together, and cut off as many figures from the right hand of the sum as there are 9's in the divisor. The figures which remain on the left hand compose the quotient, and those cut off compose the remainder.

If there be any carriage to the unit-place of the quotient, add the number carried likewise to the remainder, as in Ex. 2.; and, if the figures cut off be all 9's, add 1 to the quotient, and there is no remainder.

Ex. 1st. $99)324123$
 $\underline{3241}$
 32

Quotient $3273|96$
 3273 and rem. 96.

Ex. 2d. $99)547825$
 $\underline{5478}$
 54

Quotient $5533|57$
 5533 and rem. 57.

Ex. 3d. $999)476523$
 $\underline{476}$
 $476|999$

Quotient 477

1st, $99) 67403$
 2d, $990) 23548$
 3d, $999)6748378$
 4th, $9999)5278376$

To

To explain the reason of this, we must recollect that, whatever number of hundreds any dividend contains, it contains an equal number of 99's, together with an equal number of units. In Ex. 1. the dividend contains 3241 hundreds, and a remainder of 23. It therefore contains 3241 times 99, and also 3241, besides the remainder already mentioned: Again, 3241 contains 32 hundreds, and a remainder of 41; it therefore contains 32 ninety-nines, and also 32, besides the remainder of 41. Consequently, the dividend contains 99, altogether, 3241 times, and 32 times, that is 3273 times, and the remainder consists of 23, 41, and 32, added, which makes 96. We shall leave the reasons for working the 2d and 3d Examples to the learner's consideration.

§ 63. As multiplication supplies the place of frequent additions, and division of frequent subtractions, they are only repetitions and contractions of the simple rules, and, when compared together, their tendency is exactly opposite. As numbers, increased by addition, are diminished and brought back to their original quantity by subtraction; in like manner, numbers compounded by multiplication are reduced by division to the parts from which they were compounded. The multiplier shows how many additions are necessary to produce the number; and the quotient shows how many subtractions are necessary to exhaust it. It follows that the product, divided by the multiplicand, will quote the multiplier. It follows, also, that the dividend is equal to the product of the divisor and quotient multiplied together; and hence these operations mutually prove each other.

§ 64. To prove multiplication. Divide the product by either factor. If the operation be right, the quotient is the other factor, and there is no remainder.

To prove division. Multiply the divisor and quotient together; to the product add the remainder, if any; and, if the operation be right, it makes up the dividend. Otherwise, divide the dividend (after subtracting the remainder, if any) by the quotient. If the operation be right, it will quote the divisor. The reason of all these rules may be collected from the last paragraph.

Compound Division.

§ 65. RULE I. *When the dividend only consists of different denominations, divide the higher denomination, and reduce the remainder to the next lower, taking in the given number of that denomination, and continue the division.*

Examples.

Divide L. 465 : 12 : 8 by 72.

L.	s.	d.	L.	s.	d.
72) 465	12	8	(6	9	4
432					

33

20

72) 672

648

24

12

72) 296

288

8 Rem.

Or we might divide by the component parts of 72, as explained in § 59.

Divide 345 cwt. 1 q. 8 lb. by 22.

Cwt.	q.	lb.	Cwt.	q.	lb.
22) 345	1	8	(15	2	21
22					

125

110

15

4

22) 61

44

17

28

144

34

22) 484

44

44

44

0

1st, L. 2626 18 2 by 19

2d, 679 19 7 by 127

3d, 9032 6 8 by 245

4th, 768 3 7 by 39

5th, 871 Cwt. 3 qr. 25 lb. by 244

6th, 441 2 7 by 21

7th, 127 Acres 2 r. 4 f. by 72

8th, 150 Tons 5 cwt. by 84

§ 66. RULE II. When the divisor is in different denominations, reduce both divisor and dividend to the lowest denomination, and proceed as in simple division. The quotient is an abstract number.

To divide L. 38 : 13s. by

L. 3 : 4 : 5.

L. 3 4 5 L. 38 13

20 20

64

12

773

12

773

) 9276 (12 Quote. 120

773

To divide 96 Cwt. 1 q. 20 lb. by

3 cwt. 2 q. 8 lb.

Cwt. q. lb. Cwt. q. lb.

3 2 8) 96 1 20

4 4

14

28

385

28

120

28

3100

770

4|00

) 108|00 (27 Quote.

0

§ 67

§ 37. It is best not to reduce the terms lower than is necessary to render them equal. For instance, if each of them consists of an even number of sixpences, fourpences, or the like, we reduce them to sixpences, or fourpences, but not to pence.

To divide L. 42 : 13 : 4 by L. 5 : 6 : 8.

L. 5	6	8	L. 42	13	4	1st, L. 13403	19	4	by L. 35	7	4
20			20			2d, L. 1055	15	6	by L. 25	2	9
106			853			3d, L. 4961	6	1	by L. 45	18	3½
3			3			4th, L. 73	9	8	by L. 12	16	4
						<i>T. c. q. lb. Cwt. qr. lb.</i>					
						5th, 45	4	3	14	by 3	2 7
320			2560	8		6th, 18	4	1	7	by 3	2 14

Here we reduce both terms to fourpences.

§ 68. The use of division is to find either of the factors by whose multiplication a given number is produced, when the other factor is given; and therefore is of two kinds, since either the multiplier or the multiplicand may be given. If the former be given, it discovers what that number is which is contained so many times in another. If the latter be given, it discovers how many times one number is contained in another. Thus, it answers the questions of an opposite kind to those mentioned in § 37, when applied according to the following directions:

1st, To find the quantity of a single parcel or share; divide the amount by the number of parcels or shares: Or, to find the number of parcels; divide the amount by the quantity of a single one.

2d and 3d, To find the value, weight, or measure, of a single article; divide the value, weight, or measure, of the whole by the number of articles: Or, to find the number of articles; divide the value, weight, or measure of the whole, by that of a single article.

4th, To find how much work is done, provisions consumed, interest incurred, or the like, in a single day (or other portion of time); divide the whole work, consumption, or interest, by the number of days: Or, to find the time; divide the whole amount by the daily allowance.

5th, To find the length of a rectangular surface; divide the superficial measure by the breadth: Or, to find the breadth; divide the superficial measure by the length.

6th, To find the measure of the base of a rectangular solid; divide the solid measure by the height: Or, to find the height; divide the solid measure by the measure of the base.

7th, To find how many of a higher denomination are contained in a given number of a lower; divide the lower by the value of the higher.

§ 69. This last use of division is a kind of reduction exactly opposite to that described in § 38. The manner of conducting and arranging

ranging the operation, when there are several denominations in question, will appear from the following examples.

1. To reduce 15783 pence to pounds, shill. and pence.

$$\begin{array}{r}
 \begin{array}{r} 20 \\ 12 \end{array} \overline{) 15783} \begin{array}{r} 1315 \\ 1200 \end{array} \begin{array}{r} 65 \\ 120 \end{array} \\
 \underline{37} \quad \underline{115} \\
 \underline{36} \quad \underline{100} \\
 18 \quad 15 \\
 \underline{12} \\
 63 \\
 \underline{60}
 \end{array}$$

Answer, L. 65 : 15 : 3.

2. To reduce 174865 grains to lbs. oz. and dwt. Troy.

$$\begin{array}{r}
 \begin{array}{r} 20 \quad 12 \\ 24 \end{array} \overline{) 174865} \begin{array}{r} 7286 \\ 16800 \end{array} \begin{array}{r} 364 \\ 600 \end{array} \begin{array}{r} 30 \\ 36 \end{array} \\
 \underline{68} \quad \underline{128} \quad \underline{04} \\
 \underline{48} \quad \underline{120} \\
 206 \quad 86 \\
 \underline{192} \quad \underline{80} \\
 145 \quad 6 \\
 \underline{144}
 \end{array}$$

Answer, 30 lb. 4 oz. 6 dwt. 1 gr.

In the first example, we reduce 15783 pence to shillings, by dividing by 12, and obtain 1315 shillings, and a remainder of 3 pence. Then we reduce 1315 shillings to pounds, by dividing by 20, and obtain 65 pounds, and a remainder of 15 shillings. The divisions might have been contracted.

Questions for Practice.

1. There were planted 146835 trees in 585 rows. How many in each row?
2. How many casks will contain 2356 bottles, at 3 dozen and 2 each?
3. To divide L. 452 : 16 : $4\frac{3}{4}$ among 17 men?
4. To divide 5 tons 16 cwt. 3 qr. 1 lb. into 9 equal parts?
5. To divide 9467 acres 1 rood into 26 equal parts?
6. How much hay must be allowed for a horse each day, in order that 5568 stone may last 256 horses for 12 days?
7. A farm of 738 acres pays L. 232 : 18 : $7\frac{1}{2}$. How much does it pay per acre?
8. How many yards at 5 s. 6 d. may be purchased for L. 7 : 18 : $1\frac{1}{2}$?
9. How many guineas, weighing each 5 dwt. 6 gr. may be coined from a lump of gold weighing 12 lb. 10 oz. 17 dwt. 12 gr.?
10. How many casks are required to pack 1 ton 15 cwt. 7 lb. so that each cask may weigh, when full, 2 cwt. 1 qr. 5 lb. tare 26 lb. per cask?
11. If 2 acres 1 rood 15 falls maintain a horse, how many may be maintained on 150 acres?

- Q. A garrison have $165\frac{1}{2}$ sacks corn. They consume daily 7 sacks and a half; how long will their store last?
13. The earth revolves round the sun in 365 days 6 hours 9 minutes, describing, according to Dr Stewart, an orbit of 744457824 miles. How many miles does it move in a minute?
14. A rectangular area measures 17586 yards; its length is 490 yards, what is its breadth?
15. A rectangular field measures 3 English acres; its length is 540 yards, what is its breadth?
16. The foundation of a wall measures 156 feet, and it contains 2562 solid feet, what is its height?
- ¶ 17. 76 equal pieces linen contain 1767 yards. How much in each piece?
18. A roof which measured 19 roods, required 46189 slates, how many slates per rood?
19. To divide L. 58396 : 10 : 9 into 84 equal parts?
20. To divide 25 tons 16 cwt. 3 qr. 12 lb. into 18 equal parts?
21. To divide 718 acres 1 rood 14 falls 15 ells into 19 equal parts?
22. I bought at a sale a quantity of tea for L. 104 : 8 : $6\frac{1}{2}$, it weighed 795 lb. What is the price per lb.?
23. What is the price of 1 lb. tobacco, when 15 cwt. 3 q. 19 lb. cost L. 16 : 14 : $3\frac{1}{4}$?
24. What is the price of a yard, when a piece measuring $36\frac{1}{2}$ yards cost L. 26 : 15 : $4\frac{1}{2}$?
25. If 1375 guineas be coined from 32 lb. gold, what is the weight of each?
26. How many yards, at 7s. 4d. may be purchased for L. 14 : 2 : 4?
27. How many casks, weighing each 10 cwt. 2 q. 24 lb. may be loaded on board a ship of 92 tons burthen?
28. Required how much an income of L. 500 a-year comes to per month, per week, and per day?
29. A circle round the earth measures 24932 miles. How long would a ship take to sail round it at the rate of 6 miles an hour, if it met with no interruption?
30. If sound moves forward 1150 feet in a second, how long is the interval between the time of seeing the fire of a gun at 12 miles distance, and hearing the report?
31. A gun, being fired at $6\frac{1}{2}$ miles distance, the report is heard half a minute after the fire is seen. Required how far sound moves in a second?
32. A wall 16 yards long, requires 44 square yards of hanging to cover it. How broad is it?
- ¶ 33. The paving of a street 136 yards long, and 12 broad, cost L. 27. How much does each yard cost, and how many labourers will pave it in 8 days, if each pave 9 yards per day?
34. If 380 bolls grow on 130 Scots acres, how much does each acre

acre produce, and how much ground does it require to produce a boll?

35. There are 48 hammers in a powder mill. When at work they give, altogether, 16560 strokes in an hour. How many does each give in a minute, and what weight of powder will the mill manufacture in 24 hours, if each lb. require 672 strokes?

36. 27 reapers cut down 57 Scots acres of corn in 19 days, and receive, for their wages, L. 17 : 2s. Required how much each reaps per day; how many it requires to reap an acre per day; the daily wages of each reaper; the whole daily wages; the whole wages of each reaper; the extent of ground reaped each day, and by each reaper altogether; the expence of reaping an acre; and the extent of ground reaped for a shilling? Each answer to be found by a separate division.

37. If the human heart beat 70 times in a minute, and each pulsation transmit 4 ounces averdupois of blood, and the whole blood be one-twentieth part of the weight of the body, in what time will the whole blood of a man, whose weight is 140 lb. circulate thro' the heart?

¶ 38. How many pounds shillings and pence in 10365420 pence?

39. How many in 354285 farthings?

40. How many tons, &c. in 7396228 lb.?

41. How many lb. in 7397286 grains Troy?

42. How many Scots acres in 537643 ells?

43. How many pounds Sterling in L. 37926 Scots?

44. How many miles in 3798635 inches?

45. How many years in 5000000000 seconds?

¶ 46. How many pounds, &c. in 15679842 pence?

47. How many lb. &c. in 1426890 gr. apothecaries weight?

48. How many tons, &c. in 1538429 lb. averd.?

49. How many English acres in 34852 square yards?

50. How many pounds Sterling in 1437 merks Scots?

51. How many in 32698 half-crowns?

52. How many quarters in 378269 gallons?

53. How many lb. averd. in 3765 drams?

§ 70. In the practice of arithmetic, questions often occur which require both multiplication and division to resolve. This happens in reduction, when the higher denomination does not contain an exact number of the lower.

RULE for mixed reduction: *Reduce the given denomination by multiplication to some lower one, which is an aliquot part of both; then reduce that by division to the denomination required.*

Ex.

Ex. 1. Reduce L. 31742 to guineas.

$$\begin{array}{r}
 31742 \\
 20 \\
 \hline
 21)634840(30230 \\
 63 \dots \\
 \hline
 048 \\
 42 \\
 \hline
 64 \\
 63 \\
 \hline
 \end{array}$$

Here we multiply by 20, which reduces the pounds to shillings; and divide the product by 21, which reduces the shillings to guineas.

10 Answer, 30230 guineas and 10 shillings.

Ex. 2. Reduce 15632 guineas to pounds.

$$\begin{array}{r}
 15632 \\
 21 \\
 \hline
 15632 \\
 31264 \\
 \hline
 \end{array}$$

20)328272 shillings
L. 16413 12

Ex. 4. Reduce 1671 merks to pounds.

$$\begin{array}{r}
 1671 \\
 2 \\
 \hline
 3)3342 \text{ half merks} \\
 \text{L. 1114}
 \end{array}$$

Ex. 3. Reduce L. 1472 to merks.

$$\begin{array}{r}
 1472 \\
 3 \\
 \hline
 \end{array}$$

2)4416 half merks
2208 merks

Ex. 5. Reduce 3176 moidores to pounds.

$$\begin{array}{r}
 3176 \\
 27 \\
 \hline
 22232 \\
 6352 \\
 \hline
 \end{array}$$

20)85752 shillings
L. 4287 12

§ 71. Table of Portugueze money.

A moidore	= L. 1 7 —	A Joannes	= L. 1 16 —
A half moidore	= — 13 6	A half ditto	= — 18 —
A quarter moidore	= — 6 9	A quarter ditto	= — 9 —
A double Joannes	= 3 12 —	An eighth ditto	= — 4 6

Note 1st. Guineas may be reduced to pounds, by adding one-twentieth part of the number.

2d. Pounds may be reduced to merks by adding one-half.

3d. Merks may be reduced to pounds by subtracting one-third.

4th. Four moidores are equal to three Joannes; wherefore moidores may be reduced to Joannes, by subtracting one-fourth; and Joannes to moidores, by adding one-third.

5th. Five Joannes are equal to L.9. Hence it is easy to reduce Portugueze money to Sterling.

Questions for Practice.

1. How many guineas in L. 71463 ?
2. How many pounds in 7538260 guineas ?
3. How many merks in L. 7396428 ?
4. How many pounds, &c. in 1492650 half guineas ?
5. How many in 576323 merks ?
6. How many in 34786 Joannes ?
7. How many in 15484 moidores ?
8. How many Joannes in 17692 moidores ?
9. How many drams, scruples, and grains, in 427 dwt ?
10. How many miles, &c. in 1500 fathoms ?
- ¶ 11. How many merks in L. 154 ?
12. How many pounds in 1437 merks ?
13. How many moidores in L. 4760 : 2s. ?
14. How many half guineas in L. 1991 : 6 : 6 ?
15. How many pounds, &c. in 45728 guineas ?
16. How many in 643 Joannes, and 376 moidores ?
17. How many half crowns in 37968 half guineas ?
18. How many moidores in 6615 pistoles, at 17s. 6d. each ?
19. How many Scots ells of 37 inches in 3785 yards ?
20. How many years in 3786945 weeks ?
- ¶ 21. I had a legacy to pay of 1520 merks Scots, and have given in part 17 Joannes, 5 half ditto, 6 quarter ditto, 12 moidores, 3 half ditto, 7 quarter ditto, 7 guineas, and 15 half guineas. How much must I add to complete it ?
22. I owed James Gray 5460 merks Scots, and have assigned him a bond of L. 1230 Scots, and given him 19 guineas, 37 moidores, 11 half Joannes, 22 quarter ditto, and 50 bolls wheat at 17s. 6d. Required how much is still due him ?

§ 72. Another case, which requires both multiplication and division is, when the value, weight, measure, or duration of any quantity is given, and the value, &c. of a different quantity required, we first find the value, &c. of a single article by division, and then the value, &c. of the quantity required, by multiplication.

Ex. If 3 yards cost 15s. 9d. what will 7 yards cost at the same rate ?

$$\begin{array}{r}
 \text{s.} \quad \text{d.} \\
 3 \) \ 15 \ 9 \text{ Price of 3 yards.} \\
 \quad \underline{5 \ 3} \text{ Price of 1 yard by } \text{§} 68. \\
 \quad \quad \underline{7}
 \end{array}$$

L. 1 16 9 Price of 7 yards by § 37.

Many other instances might be adduced, where the operation, and the

the reason of it, are equally obvious. These are generally, though unnecessarily, referred to the rule of proportion.

§ 73. We shall now offer a general observation on all the operations in arithmetic. When a computation requires several steps, the same answer is obtained, whatever order we follow. Some arrangements may be preferable to others in point of ease, but all of them lead to the same conclusion. In addition, or subtraction, we may take the articles in any order; or, we may collect them into several sums, and add or subtract these, either separately or together. When both the simple operations are required to be repeated, we may either complete one of them first, or may introduce them promiscuously; and the compound operations admit of the same variety. When several numbers are to be multiplied together, we may take the factors in any order, or we may arrange them into several classes, find the product of each class, and then multiply the products together. When a number is to be divided by several others, we may take the divisors in any order, or we may multiply them into each other, and divide by the product; or we may multiply them into several parcels, and divide by the products successively. Lastly, when multiplication and division are both required, we may begin with either; and, when both are repeatedly necessary, we may collect the multipliers into one product, and the divisors into another; or, we collect them into parcels, or use them singly, and that in any order.

§ 74. When both multiplication and division are necessary for solving a question, it is generally best to begin with the multiplication, as this order keeps the account as clear as possible from fractions. The example given in § 72, may be wrought accordingly as follows:

$$\begin{array}{r}
 \text{s.} \quad \text{d.} \\
 15 \quad 9 \\
 \quad \quad 7 \\
 \hline
 3)5 \quad 10 \quad 3 \\
 \quad 1 \quad 16 \quad 9
 \end{array}$$

§ 75. Some accountants prove the operations of arithmetic by a method called casting out the 9's, which depends on the following principles:

First, if several numbers be divided by any divisor (the remainders being always added to the next number), the sum of the quotients, and the last remainder, will be the same as is obtained by dividing the sum of the numbers. Thus, 19, 15, and 23, contain, together, as many 5's, as many 7's, &c. as their sum 57 does, and the remainders are the same; and, in this way, addition may be proved by division. It is from the correspondence of the remainders, that the proof, by casting out the 9's, is inferred.

Secondly, If any figure, with cyphers annexed, be divided by 9,

the quotient consists entirely of that figure; and the remainder is also the same. Thus, 40, divided by 9, quotes 4, remainder 4; and 400, divided by 9, quotes 4, remainder 44. The same holds with all the digits; and the reason will easily be apprehended; every digit, with a cypher annexed, contains exactly so many ten's; it must therefore contain an equal number of 9's, besides a remainder of an equal number of units.

Thirdly, If any number be divided by 9, the remainder is equal to the sum of the figures of the number, or to the remainder obtained, when that sum is divided by 9. For instance, 3765, divided by 9, leave a remainder of 3, and the sum of 3, 7, 6, and 5, is 21; which, divided by 9, leaves a remainder of 3. The reason of this will appear from the following illustration:

3000	divided by 9	quotes 333;	remainder 3
700		quotes 77;	remainder 7
60		quotes 6;	remainder 6
5		quotes 0;	remainder 5
3765		416	Sum of remaind. 21
Again; 21	divided by 9	quotes 2;	remainder 3

Wherefore, 3765 divided by 9 quotes 416; remainder 3; for the reason given. Hence we may collect the following rules for practice:

§ 76. To cast the 9's out of any number, or to find what remainder will be left when any number is divided by 9; add the figures; and, when the sum exceeds 9, add the figures which would express it; pass by the 9's; and, when the sum comes exactly to 9, reject it, and begin anew. For, example, if it be required to cast the 9's out of 3573294, we reckon thus: 3 and 5 is 8, and 7 is 15; 1 and 5 is 6, and 3 is 9, which we reject; 2 and (passing by 9) 4 is 6; which is the remainder or RESULT. If the article out of which the 9's are to be cast, contains more denominations than one, we cast the 9's out of the higher, and multiply the result by the value of the lower, and carry on the product (casting out the 9's, if necessary) to the lower.

To prove addition, cast the 9's out of the several articles, carrying the results to the following articles; cast them also out of the sum. If the operation be right, the results will agree.

To prove subtraction, cast the 9's out of the minuend; cast them also out of the subtrahend and remainder together; and, if you obtain the same result, the operation is presumed right.

To prove multiplication, cast the 9's out of the multiplicand, and also out of the multiplier, if above 9. Multiply the results together, and cast the 9's, if necessary, out of their product. Then cast the 9's out of the product, and observe if this result correspond with the former. The results are generally placed round a cross, as in the following examples.

Ex.

Ex. 1st. $9276 \text{ ref. } 6 \times 8 = 48 \text{ ref. } 3$. Ex. 2d. 7898

$$\begin{array}{r}
 8 \\
 \hline
 74208 \text{ ref. } 3..
 \end{array}
 \quad
 \begin{array}{r}
 3 \\
 6 \times 8 \\
 3
 \end{array}
 \quad
 \begin{array}{r}
 48 \\
 \hline
 63184 \\
 31592 \\
 \hline
 379104
 \end{array}
 \quad
 \begin{array}{r}
 6 \\
 5 \times 3 \\
 6
 \end{array}$$

The reason of this will be evident, if we consider multiplication under the view of repeated addition. In the first example it is obviously the same. In the second, we may suppose the multiplicand repeated 48 times. If this be done, and the 9's cast out, the result, at the end of the 9th line, will be 0; for any number, repeated 9 times, and divided by 9, leaves no remainder. The same must happen at the end of the 18th, 27th, 36th, and 45th lines; and the last result will be the same as if the multiplicand had only been repeated 3 times. This is the reason for casting out the 9's from the multiplier as well as the multiplicand.

To prove division, cast the 9's out of the divisor, and also out of the quotient, multiply the results, and cast the 9's out of the product. If there be any remainder, add it to the result, casting out the 9's, if necessary. If the accompt be right, the last result will agree with that obtained from the dividend.

Ex. 42) 2490 (59 ref. $5 \times 6 = 30 \text{ ref. } 3$.
 ref. 6 210

390
 378

Rem. 12

ref. 3.

And the result of the dividend is 6.

This depends on the same reason as the last; for the dividend is equal to the product of the divisor and quotient added to the remainder.

We cannot recommend this method, as it lies under the following disadvantages:

First, If an error of 9, or any of its multiples, be committed, the results will nevertheless agree; and so the error will remain undiscovered. And this will always be the case, when a figure is placed or reckoned in a wrong column; which is one of the most frequent causes of error.

Secondly, When it appears by the disagreement of the results, that an error has been committed, the particular figure or figures in which the error lies are not pointed out; and, consequently, it is not easily corrected.

§ 77. The operation of casting out the 3's is similar to that of casting

casting out the 9's. The remainder of any number divided by 3 is the same as the remainder of the sum of the figures it consists of divided by 3; and the reason will be obvious from what has been already pointed out, if we conceive any number of articles assorted into parcels of 9, and each of these subdivided into parcels of 3. To cast the 3's out of any number, add the figures, neglecting 3 and its multiples 6 and 9; and when the sum amounts to 3, or any of its multiples, reject it, and carry on the computation with the excess only. For example, in casting the 9's out of 286754, we compute thus; 2 and 8 is 10, which is thrice 3 and 1 over; 1 and (passing by 6) 7 is 8, which is twice 3 and 2 over; 2 and 5 is 7, which contains 3 twice and 1 over; lastly, 1 and 4 is 5, which contains 3 once and 2 over; wherefore the result is 2.

The arithmetical operations may be proved by casting out the 3's, but errors of 3 or of any multiple of 3 will not be detected.

CHAP. VI.

RULE OF PROPORTION.

SECT. I. SIMPLE PROPORTION.

§ 78. **T**HE meaning of proportion is universally known. Quantities are reckoned proportional to each other when they are connected in such a manner, that, if one of them be increased or diminished, the other increases or diminishes at the same time; and the degree of the alteration on each is a like part of its original measure. Though this way of conceiving proportion be sufficiently proper, it is necessary to fix the sense of it more precisely, in order to lay the foundation of the doctrines which depend on it.

Four numbers are in the same proportion, the first to the second as the third to the fourth, when the first contains the second, or any part of it, as often as the third contains the fourth, or the like part of it. In either of these cases, the quotient of the first, divided by the second, is equal to that of the third divided by the fourth; and this quotient may be called the measure of the proportion.

Proportionals are marked down in the following manner:

$$\begin{array}{l} 6 : 3 :: 8 : 4 \\ 12 : 36 :: 9 : 27 \\ 9 : 6 :: 24 : 18 \\ 16 : 24 :: 10 : 15 \end{array}$$

§ 79. The rule of proportion directs us, when three numbers are given, how to find a fourth, to which the third may have the same proportion that the first has to the second. It is sometimes called the Rule of Three, from the three numbers given, and sometimes the Golden Rule, from its extensive utility.

RULE.

RULE. *Multiply the second and third terms together, and divide the product by the first.*

Ex. To find a fourth proportional to 18, 27, and 34.

$$18 : 27 :: 34 : 51$$

$$\begin{array}{r} 34 \\ \hline 108 \\ 81 \\ \hline 18 \overline{) 918} 51 \\ 90 \\ \hline 18 \\ 18 \\ \hline 0 \end{array}$$

To explain the reason of this, we must observe, that, if two or more numbers be multiplied or divided alike, the products or quotients will have the same proportion.

$$\begin{array}{l} 18 : 27 \\ \text{Multiplied by 34, } 612 : 918 \\ \text{Divided by 18, } 34 : 51 \end{array}$$

The products 612, 918, and the quotients 34, 51, have therefore the same proportion to each other that 18 has to 27. In the course of this operation, the products of the first and third term is divided by the first; therefore the quotient is equal to the third, by § 63.

§ 80. The first and second terms must always be of the same kind; that is, either both monies, weights, measures, both abstract numbers, or the like. The fourth, or number sought, is of the same kind as the third.

When the terms are in more denominations than one, if the compound multiplications and divisions can be conveniently performed, it is best to do so. If not reduce each term to the lowest denomination, and the first and second to the same name. If all the terms be of the same kind, it is sufficient if either the second or third be reduced to the same name with the first; the number required is of the same name as the other term.

§ 81. The accomptant must consider the nature of every question, and observe the circumstance upon which the proportion depends; and common sense will direct him to this, if the terms of the question be understood. It is evident that the value, weight, and measure, of any commodity is proportioned to its quantity; that the amount of work or consumption is proportioned to the time; that gain, loss, or interest, when the rate and time are fixed, is proportioned to the capital sum from which it arises; and that the effect

pro-

produced by any cause is proportioned to the extent of the cause. In these, and many other cases, the proportion is direct, and the number sought increases or diminishes along with the term from which it is derived.

§ 82. In some questions, the number sought becomes less, when the circumstance from which it is derived becomes greater. Thus, when the price of goods increases, the quantity which may be bought for a given sum is smaller. When the number of men employed at work is increased, the time in which they may complete it becomes shorter; and, when the activity of any cause is increased, the quantity necessary to produce a given effect is diminished. In these, and the like, the proportion is said to be inverse.

§ 83. GENERAL RULE for stating all questions, whether direct or inverse.

Place that number for the third term which signifies the same kind of thing with what is sought, and consider whether the number sought will be greater or less. If greater, place the least of the other terms for the first; but, if less, place the greatest for the first.

Ex. 1st. If 30 horses plow 12 acres, how many will 42 plow in the same time?

H. H. A.

30 : 42 :: 12

Here, because the thing sought is a number of acres, we place 12, the given number of acres, for the third term; and, because 42 horses will plow more than 12, we make the lesser number, 30, the first term, and the greater number, 42, the second term.

Ex. 2d. If 40 horses be maintained for a certain sum on hay, at 5d. per stone, how many will be maintained on the same sum when the price of hay rises to 8d.?

d. d. H.

8 : 5 :: 40

Here, because a number of horses is sought, we make the given number of horses 40, the third term; and, because fewer will be maintained for the same money, when the price of hay is dearer, we make the greater price, 8d. the first term; and the lesser price, 5d. the second term.

§ 84. The first of these examples is direct, the second inverse. Every question consists of a supposition and demand. In the first, the supposition is, *that 30 horses plow 12 acres*, and the demand, *how many will plow 42?* and the first term of the proportion, 30, is found in the supposition, in this, and every other direct question. In the second, the supposition is, *that 40 horses are maintained on hay at 5d.* and the demand, *how many will be maintained on hay at 8d?* and the first term of the proportion, 8, is found in the demand, in this and every other inverse question.

§ 85. When a question is stated, if the first and second term, or first and third, be measured by the same number, we may divide them

them by that measure, and use the quotients in place of the original numbers.

Ex. If 36 yards cost 42 shillings, what will 27 cost?

Y. Y. sh.

36 : 27 :: 42

4 : 3 :: 42

3

— s. d.

4) 126 (31 6

Here 36 and 27 are both measured by 9, and we work with the quotients 4 and 3.

Questions for Practice.

1. If 12 yards cloth cost 19s. 4d. what will 54 cost?
2. If a ton iron cost L. 7 : 10s. what will 40 lb. cost?
3. If 6 pieces linen, qt. each 28 yards, cost L. 21, what will 12 yards cost?
4. If $3\frac{1}{2}$ ounces silver be worth 18s. how much may be purchased for L. 20?
5. If 7 bushels weigh 532 lb. how much will 6 pecks weigh?
6. If 3d. be gained on a yard worth 2s. 4d. how much will be gained on L. 100 value?
7. If 3 farthings be gained on a shilling, to what extent must one deal to gain L. 100?
8. If L. 500 purchase 22 pieces of cloth 30 yards each, how much may be purchased for L. 3200?
9. If L. 300 be laid out to improve 35 acres of land, how much will be laid out to improve 374 acres?
10. If 100 men consume 70 bolls in 3 months, how much will 3560 consume?
11. If a garrison consume 38 barrels provisions in a week, how much will they consume in 50 days?
12. If the interest of L. 100 be L. 4 for a year, what is the interest of L. 327?
13. If the interest of L. 100 be L. 4 for a year, how much is it for a month, a week, and a day?
14. If the interest of a sum for 30 days be L. 35 : 2 : 10, at 5 per cent. how much is it for the same time at 4 per cent.?
- ¶ 15. A farm produces one year 300 bolls, which are sold at 14s. 6d. per boll; next year, being plentiful, and prices low, the crop is sold at 9s. and yields exactly the same money. How much did the farm produce?
16. If a sixpence loaf weigh 3 lb. Troy when wheat is at 4s. per bushel, how much should it weigh when wheat is at 4s. 6d.?
17. If 60 men perform a piece of work in 28 days, in how many days will 84 men perform it?
18. If 20 men perform a piece of work in 12 days, how many men will perform it in 16 days?
19. If there be provisions laid in for a garrison of 2000 men for

3 months of 30 days, how long will they last if a body of 500 be sent to reinforce them?

20. If there be provisions for 500 men for 60 days, how many must be turned out in order that the provisions may last 96 days?

¶ 21. If 18 C. sugar cost L. 75, what will 32 C. cost.

22. If 15 C. cost L. 56, what will 8 C. 1 qr. cost?

23. If 7 ounces silver be worth 38s. 6d. what is the value of 3 lb. 9 oz. 12 dwt.?

24. If 3 C. 2 q. 18 lb. cost L. 14:10:5, what will 7 C. 2 qr. 15 lb. cost?

25. If one farms 154 acres land for L. 57:15s. how much ground should be farmed for L. 150?

26. If 50 yards cloth be purchased for L. 36:17:6, how much will be purchased for L. 76?

27. If 4 persons among 100 die annually, how many burials will be in a town consisting of 3625 persons?

28. If there be 5 births in that town for 4 burials, and 12 girls born for 13 boys, how many boys and girls will be born annually therein?

29. If 24 men consume 126 bolls victual in a year, how much will 40 families of 5 persons each require?

30. If one gain L. 1:15s. on a hogthead of wine worth L. 15, how many must he sell, and to what extent must he deal, in order to gain L. 100?

31. If 3 roods 15 poles produce 3 quarters 2 bushels 3 gallons of wheat, how much will 12 acres 2 roods 25 poles produce?

32. If 11358 soldiers be kept for L. 239937:15s. how much will 35666 be kept for; and how many will be kept for L. 422521:2:6?

¶ 33. If I can maintain 14 horses for a certain value of hay for 150 days, when the price is $4\frac{1}{2}$ d. per stone, how long will an equal value last when hay is at 6d?

34. Last year 30 men reaped a farm in 27 days, how many must be engaged to reap it this year in 10 days?

35. If 15 masons build a house in 30 days, how long will 9 masons take to build the same?

36. If 21 barrels of 32 gallons hold a certain quantity of goods, how many barrels of 42 gallons each will hold the same?

37. If a quantity corn grow on 80 acres, when the seed yields 6 returns per acre, how much ground will produce the same, when the seed only yields $3\frac{1}{2}$ returns?

38. An oak, 40 years old, has grown 6 inches one year with another, and is now of the same height with a fir that has grown 10 inches each year. Required the age of the fir?

39. I am to give 7 acres, worth 25s. rent per acre, in exchange for ground worth 13s. 4d. per acre. How much ought I to receive?

40. If 16 lads, of 16 years of age, do a piece of work, how many men, 24 years old, will do the same in an equal time, supposing their strength to increase in the same proportion as their age?

SECT. II. COMPOUND PROPORTION.

§ 86. SOMETIMES the proportion depends upon several circumstances. Thus, it may be asked, if 18 men consume 6 bolls corn in 28 days, how much will 24 men consume in 56 days? Here the quantity required depends partly on the number of men, partly on the time, and the question may be resolved into the two following ones:

1st, If 18 men consume 6 bolls in a certain time, how many will 24 men consume in the same time?

M. M. B. B.

18 : 24 :: 6 : 8
6

Answer, 24 men will consume 8 bolls in the same time.

18)144(8

2d, If a certain number of men consume 8 bolls in 28 days, how many will they consume in 56 days?

D. D. B. B.

28 : 56 :: 8 : 16
8

Answer. The same number of men will consume 16 bolls in 56 days.

28)448(16

In the course of this operation, the original number of bolls, 6, is first multiplied into 24, then divided by 18, then multiplied into 8, then divided by 28. It would answer the same purpose to collect the multipliers into one product, and the divisors into another; and then to multiply the given number of bolls by the former, and divide the product by the latter. See § 73.

The above question may therefore be stated and wrought as follows:

Men 18 : 24 :: 6 bolls
Days 28 : 56

144 144
36 120

504 1344
6

504)8064(16

Here we multiply 18 into 24 for a divisor, and 6 into the product of 24 by 56, for a dividend.

§ 87. In general, state the several particulars on which the question depends, as so many simple proportions, attending to the sense of the question

question to discover whether the proportions should be stated directly or inversely; then multiply all the terms in the first rank together, and all those in the second rank together; and work with the products as directed in the simple rule of proportion.

Example. If 100 men make 3 miles of road in 27 days, in how many days will 150 men make 5 miles?

Men	150	:	100	::	27 days
Miles	3		5		
	450		500		
			27		

Here the first stating is inverse, because more men will do it in fewer days; but the second is direct, because more miles will require more days.

450)13500(30 days answer.

§ 88. The following contraction is often useful. After stating the proportion, if the same number occurs in both ranks, dash it out from both; or, if any term in the first rank, and another in the second rank, are measured by the same numbers, dash out the original terms, and use the quotients in their stead.

Ex. If 18 men consume L. 30 value of corn in 9 months, when the price is 16s. per boll, how many will consume L. 54 value in 6 months, when the price is 12s. per boll? In this question, the proportion depends upon three particulars, the value of corn, the time, and the price. The first of which is direct, because the more the value of provisions is, the more time is required to consume them; but the second and third are inverse, for the greater the time and price is, fewer men will consume an equal value.

Value 30 : 54 :: 18 men.

Months 6 : 9

Price 12 : 16

10 9

3 3

4

36

18

288

36

10)648(64 $\frac{8}{18}$.

Here we observe that 6 in the first rank measures 54 in the second; so we dash them out, and place the quotient 9 in the second rank. Next, because 30 and 9 are both measured by 3, we dash them out, and place down the quotients 10 and 3; then, because 12 and 16 are both measured by 4, we dash them out, and place down the quotients 3 and 4. Lastly, because there is now 3 in both columns, we dash them out, and work with the remaining terms, according to the rule.

§ 89. The monies, weights, and measures, of different countries, may be reduced from the proportion which they bear to each other.

Ex. If 112 lb. averdupois make 104 lb. of Holland, and 100 lb.

of

of Holland make 89 of Geneva, and 110 of Geneva make 117 of Seville, how many lbs. of Seville will make 100 lb. averdupois?

$$112 : 104 :: 100$$

$$100 : 89$$

$$110 : 117$$

If it be required, how many lb. averdupois will make 100 of Seville, the terms would have been placed in the different columns thus :

$$104 : 112 :: 100$$

$$89 : 100$$

$$117 : 110$$

1. If 50 men cut down 30 acres corn in a week, how many will cut down 400 acres in 20 work-days?

2. If 50 men cut down 30 acres corn in a week, how much will 10 men cut in 40 work-days?

3. If 50 men cut down 30 acres in a week, how long will 6 men take to cut down 25 acres?

4. If 40 men, working 10 hours each day, make a mile road in 16 days, how much will 50 men make in 60 days, working 8 hours each day?

5. If 30 horses use L. 150 value of hay in 6 months, when the price is 6 d. per stone, what value will 20 horses use in 5 months, at $4\frac{1}{2}$ per stone.

6. If 9 men build a wall 120 feet long, $2\frac{1}{2}$ broad, and 15 high, in 20 days, how many will build a wall 100 feet long, 2 broad, and 10 high, in 5 days?

¶ 7. If the freight of a ship of 170 tons for 3 months be L. 90, how much should the freight of a ship of 118 tons for 5 months be?

8. If the interest of L. 100 for a year be L. 5, what will the interest of L. 236 for 78 days be?

9. If 45 horses plow 48 acres in 6 days, in what time will 60 horses plow 125 acres?

10. If a chest, 18 feet long, 7 broad, and 5 deep, hold 60 bolls meal, how much will be held in a chest 40 feet long, 9 broad, and 7 deep?

11. If 12 oxen be maintained on 15 acres for 4 months, how many sheep will be maintained on 36 acres for 3 months, supposing 7 sheep to eat as much as 1 ox?

12. 1 lb. of gold is about 14 times more valuable than 1 lb. of silver, and the proportion of its weight to that of silver is as 19 to 10. Required the value of a bar of silver equal in bulk to one of gold worth L. 1000?

¶ 13. If 78 lasts of Hamburgh make 70 of Amsterdam, and 30 lasts of Amsterdam make 315 English quarters, and 100 English quar-

quarters make 198 bolls; how many bolls in 1000 lafts of Ham-
burgh, and how many lafts of Hamburgh in 1000 bolls?

14. If 73 lb. averdupois make 64 of Rouen, and 57 of Rouen
make $69\frac{1}{2}$ of Tholoufe, and 112 of Tholoufe make $84\frac{1}{2}$ of Geneva,
and 53 of Geneva make 69 lb. of Lyons; how many lb. averdupois
in 100 lb. of Lyons, and how many lb. of Lyons in 112 lb. averdu-
pois?

SECT. III. DISTRIBUTIVE PROPORTION.

§ 90. IF it be required to divide a number into parts, which have
the same proportion to each other that feveral other given numbers
have, we add thefe numbers together, and ftate the following propor-
tion: As the fum, is to the particular numbers, fo is the number re-
quired to be divided, to the feveral parts fought.

Ex. 1st. Four partners engage to trade in company; A's ftock is
L. 150, B's L. 320, C's L. 350, D's L. 500, and they gain L. 730; re-
quired how much belongs to each, if the gain be divided among them
in proportion to their ftocks?

							Rem.
A's ftock	L. 150	1320 : 150 ::	730 : L.	82	19	1	— 120
B's	320	1320 : 320 ::	730 :	176	19	4	— 960
C's	350	1320 : 350 ::	730 :	193	11	2	— 720
D's	500	1320 : 500 ::	730 :	276	10	3	— 840

Wholeftock 1320

Proof L. 730

This accompt is proved by adding the gains of the partners; the
fum of which will be equal to the whole gain, if the operation be
right; but if there be remainders, they muft be added, their fum di-
vided by the common divifor, and the quotient carried to the loweft
place.

Ex. 2^d. A bankrupt owes A L. 146, B L. 170, C L. 45, D L. 480,
and E L. 72; his whole effects are only L. 342 : 7 : 6. How much
fhould each have?

A's debt	L. 146	913 : 146 ::	L. 342	7	6	: L. 54	15	A's fhare.
B's	170	913 : 170 ::	342	7	6	63	15	B's
C's	45	913 : 45 ::	342	7	6	16	17	6 C's
D's	480	913 : 480 ::	342	7	6	180		D's
E's	72	913 : 72 ::	342	7	6	27		E's
		913						
			L. 342 7 6					

This might alfo be calculated, by finding what compofition the
bankrupt was able to pay per pound; which is obtained, by dividing
the amount of his effects by the amount of his debts; and comes to
7s. 6d. and then finding, by the rules of practice, how much each
debt comes to at that rate?

Qu. 1.

Qu. 1. Three merchants pay money into a common stock; A pays L. 100, which lies 8 months; B pays 70, which lies 6 months; and C pays L. 50, which lies 10 months. The profits come to L. 45. Required to divide them so that each may have a share proportioned to his stock, and the time it was in trade?

2. A bankrupt owes A L. 365, B L. 229, C L. 438, D L. 318; his effects come only to L. 585. Required how it ought to be divided among them?

3. Four gentlemen are to divide a common of 1146 acres 3 roods, in proportion to their rents, which are L. 50, L. 100, L. 150, and L. 300; how much should each have?

4. If A insures on a ship L. 130, B L. 75, C L. 36, D L. 28, and E L. 49; the whole value being L. 400, and damage be sustained to the extent of L. 250; how much must each pay, and how much must the proprietor bear?

5. A church, containing 1870 feet of area, besides 510 in galleries, is to be divided among 9 heritors, whose valued rents are L. 70, L. 165 : 10s. L. 140, L. 80, L. 92 : 10s. L. 55, L. 120, L. 96, and L. 31; so that each may have a share, both of the ground-area and galleries, in proportion to his rent?

6. To divide a prize taken at sea, value L. 2000, among the captain, 2 lieutenants, the surgeon, 8 warrant officers, and 100 men; allowing each warrant-officer 3 shares, the lieutenants and surgeon 12 shares each, and the captain 32 shares?

7. A tract of land in America, measuring 834 acres 3 roods 36 poles, is to be distributed among a regiment, consisting of 1 colonel, 1 lieutenant-colonel, 1 major, 7 captains, 12 lieutenants, 8 ensigns, 20 serjeants, and 540 private soldiers; so that a serjeant may have twice the share of a private soldier, an ensign eight shares, a lieutenant 12, a captain 20, the major 30, the lieutenant-colonel 40, and the colonel 60?

CHAP. VII.

RULES FOR PRACTICE.

§91. **T**HE operations explained in the foregoing chapters, comprehend the whole system of arithmetic, and are sufficient for every computation. In many cases, however, the work may be contracted, by adverting to the particular circumstances of the question. We shall explain, in this chapter, the most useful methods which practice has suggested, for rendering mercantile computations easy; in which, the four elementary rules of arithmetic are sometimes jointly, sometimes separately, employed.

SECT. I. COMPUTATION OF PRICES.

§92. THE value of any number of articles, at a pound, a shilling, or a penny, is an equal number of pounds, shillings, or pence; and these two last are easily reduced to pounds. The value, at any other rate, may be calculated by easy methods, depending on some contraction already explained, or on one or more of the following principles:

1st, If the rate be an aliquot part of a pound, a shilling, or a penny, then an exact number of articles may be bought for a pound, a shilling, or a penny; and the value is found by dividing the given number accordingly. Thus, to find the price of so many yards, at 2s. 6d. which is the eighth part of a pound, we divide the quantity by 8, because every 8 yards cost L. 1.

2d, If the rate be equal to the sum of two other rates, which are easily calculated, the value may be found by computing these separately, and adding the sums obtained. Thus, the price of so many yards at 9d. is found, by adding their prices at 6d. and 3d. together.

3d, If the rate be equal to the difference of two easy rates, they may be calculated separately, and the lesser subtracted from the greater. Thus, the value of so many articles at 11d. is found, by subtracting their value at a penny from their value at a shilling. We may suppose that a shilling was paid for each article, and then a penny returned on each.

4th, If the rate be a composite number, the value may be found by calculating what it comes to at one of the component parts, and multiplying the same by the other.

§93. CASE I. *When the rate is an aliquot part of a pound, divide the quantity by the number which may be bought for a pound.*

Table of the Aliquot Parts of L. 1.

10 shillings	=	$\frac{1}{2}$ of L. 1.
6s. 8d.	=	$\frac{1}{3}$
5s.	=	$\frac{1}{4}$
4s.	=	$\frac{1}{5}$
3s. 4d.	=	$\frac{1}{6}$
2s. 6d.	=	$\frac{1}{8}$
2s.	=	$\frac{1}{10}$
1s. 8d.	=	$\frac{1}{12}$

1 shilling 4d.	=	$\frac{1}{12}$ of L. 1.
1s.	3d.	= $\frac{1}{16}$
1s.		= $\frac{1}{20}$
	8d.	= $\frac{1}{15}$
	6d.	= $\frac{1}{10}$
	4d.	= $\frac{1}{6}$
	3d.	= $\frac{1}{8}$
	2d.	= $\frac{1}{10}$

Ex. 1st. What is the value of
7463 yards, at 4s.?

$$\begin{array}{r} 5 \overline{) 7463} \\ \text{L. } 1492 \quad 12\text{s.} \end{array}$$

Ex. 2d. What is the value of
1773 lb. at 3d.?

$$\begin{array}{r} 8 \overline{) 1773} \\ \text{L. } 22 \quad 3 \quad 3 \end{array}$$

In the first example, we divide by 5, because 4s. is $\frac{1}{5}$ of a pound; the

the quotient 1492 shows how many pounds they amount to; besides which, there remains 3 yards at 4s. and these come to 12s. In the second example, we divide by 80, as directed, and the quotient gives L. 22, and the remainder 13 yards; which, at 3d. come to 3s. 3d.

- | | |
|--|----------------------|
| 1. 375 yds, lbs. or the like, at 10s.? | 13. 961 at 1s. 8d.? |
| 2. 854 at 6s. 8d.? | 14. 4372 at 6s. 8d.? |
| 3. 475 at 5s.? | 15. 8563 at 5s.? |
| 4. 3762 at 3s. 4d.? | 16. 7421 at 4s.? |
| 5. 875 at 2s. 6d.? | 17. 3591 at 2s. 6d.? |
| 6. 7425 at 2s.? | 18. 2534 at 6d.? |
| 7. 4167 at 1s. 8d.? | 19. 899 at 8d.? |
| 8. 1432 at 8d.? | 20. 645 at 4d.? |
| 9. 4578 at 6d.? | 21. 1438 at 3d.? |
| 10. 975 at 4d.? | 22. 7239 at 2d.? |
| 11. 3747 at 2d.? | 23. 4326 at 2s.? |
| 12. 2428 at 1s. 4d.? | 24. 7398 at 1s. 3d.? |

§ 94. CASE II. When the rate consists of shillings only, multiply the quantity by the number of shillings, and divide the product by 20: Or, if the number of shillings be even, multiply by half the number, and divide the product by 10.

Ex. 1st. 4573 at 13s.

$$\begin{array}{r} 13 \\ \hline 13719 \\ 4573 \\ \hline \end{array}$$

20)59449

L. 2972 9s.

Ex. 2d. 7543 at 14s.

$$\begin{array}{r} 7 \\ \hline 10)52801 \\ \hline \end{array}$$

L. 5280 2s.

The answer might have been set down at once.

If the rate be the sum of two or more aliquot parts of a pound, we may calculate these as directed in Case I. and add them. If it be any odd number of shillings, we may calculate for the even number next lower, and add thereto the value at a shilling. If it be 19s. we may subtract the value at a shilling from the value at a pound.

- | | |
|--------------------|--------------------|
| 1. 9437 at 3s.? | 11. 23595 at 7s.? |
| 2. 768581 at 17s.? | 12. 63409 at 17s.? |
| 3. 4293 at 9s.? | 13. 37253 at 13s.? |
| 4. 18734 at 13s.? | 14. 46843 at 9s.? |
| 5. 52378 at 7s.? | 15. 42329 at 11s.? |
| 6. 35286 at 19s.? | 16. 84397 at 8s.? |
| 7. 76325 at 6s.? | 17. 26495 at 12s.? |
| 8. 73562 at 14s.? | 18. 76483 at 16s.? |
| 9. 42314 at 16s.? | 19. 23598 at 18s.? |
| 10. 5642 at 18s.? | 20. 14972 at 14s.? |

§ 95. CASE III. *When the rate consists of pence only,*

METHOD I. *If the rate be an aliquot part of a shilling, divide the quantity accordingly, which gives the answer in shillings: if not, it may be divided into two or more aliquot parts; calculate these separately, and add the values; reduce the answer to pounds.*

1 penny is $\frac{1}{12}$ of a shilling.

2d. $\frac{1}{6}$ of ditto.

3d. $\frac{1}{4}$ of ditto.

4d. $\frac{1}{3}$ of ditto.

6d. $\frac{1}{2}$ of ditto.

5d. is the sum of 4d. and 1d. or of 2d. and 3d.

7d. is the sum of 4d. and 3d. or of 6d. and 1d.

8d. is the sum of 6d. and 2d. or the double of 4d.

9d. is the sum of 6d. and 3d.

10d. is the sum of 6d. and 4d.

11d. is the sum of 6d. 3d. and 2d.

Ex. 1st. 7423 at 4d.

3)7423
20)2474 4
L. 123 14 4

Here, because 4d. is one third of a shilling, we divide by 3, which gives the price in shillings, and reduce these by division to pounds.

Ex. 2^d. 4856 at 11d.

At 6d. = $\frac{1}{2}$ of 1s. 2428

At 3d. = $\frac{1}{4}$ of 6d. 1214

At 2d. = $\frac{1}{3}$ of 6d. 809 4

11d. 4451 4
L. 222 11 4

Here we calculate what the articles would cost at 6d. at 3d. and at 2d. and add the values.

§ 96. It is sometimes easier to calculate at two rates, whose difference is the rate required, and subtract the lesser value from the greater. Thus, the last example may be wrought by subtracting the value at a penny from the value at a shilling. The remainder must be the value at 11d.

At 1s. 4856s.

At 1d. = $\frac{1}{12}$ 404 8

At 11d. 4451 4
L. 222 11 4

10d. may be wrought as the difference of 1s. and 2d.; and several other rates in like manner.

§ 97. METHOD II. *Multiply the quantity by the number of pence, the product is the answer in pence. Reduce it to pounds.*

§ 98. METHOD III. *Find the value at a penny by division, and multiply the same by the number of pence.*

CHAP. VII. RULES FOR PRACTICE.

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- | | |
|-------------------|--------------------|
| 1. 143267 at 1d.? | 11. 5763 at 1d.? |
| 2. 43227 at 2d.? | 12. 4592 at 7d.? |
| 3. 43247 at 3d.? | 13. 359483 at 5d.? |
| 4. 74265 at 4d.? | 14. 85936 at 9d.? |
| 5. 375652 at 5d.? | 15. 5497 at 10d.? |
| 6. 46723 at 7d.? | 16. 6846 at 11d.? |
| 7. 12340 at 8d.? | 17. 3753 at 4d.? |
| 8. 4055 at 9d.? | 18. 7593 at 8d.? |
| 9. 7328 at 10d.? | 19. 1350 at 6d.? |
| 10. 5928 at 11d.? | 20. 6793 at 2d.? |

§ 99. CASE IV. *When the rate consists of farthings only, find the value in pence, and reduce it by division to pounds.*

Ex. 72564 at $\frac{1}{4}$ d.

Or thus: 72564

3
 4) 217692 farth.
 12) 54423 pence.
 4535 3
 L. 226 15 3

At $\frac{1}{2}$ d. 36282 d.

At $\frac{1}{4}$ d. 18141 d.

12) 54423 d.
 4535 3
 L. 226 15 3

1. 723964 at $\frac{1}{4}$ d.?

4. 50732 at $\frac{1}{4}$ d.?

2. 436567 at $\frac{1}{2}$ d.?

5. 85921 at $\frac{1}{2}$ d.?

3. 594822 at $\frac{3}{4}$ d.?

6. 179999 at $\frac{3}{4}$ d.?

§ 100. CASE V. *When the rate consists of pence and farthings, find the value of the pence, as directed in CASE III. and that of the farthings from the proportion which they bear to the pence. Add these together, and reduce.*

Ex. 1st. 3287 at $5\frac{1}{4}$ d.

Ex. 2d. 2772 at $7\frac{1}{2}$ d.

At 4d. = $\frac{1}{3}$ of 1s. 1095 8

At 6 d. = $\frac{1}{2}$ of 1s. 1386

At 1d. = $\frac{1}{4}$ of 4d. 273 11

At $1\frac{1}{2}$ d. = $\frac{1}{4}$ of 6d. 346 6

At 1 f. = $\frac{1}{4}$ of 1d. 68 $5\frac{1}{4}$

At $7\frac{1}{2}$ d. 1732 6

At $5\frac{1}{4}$ d. 1438 $\frac{3}{4}$

L. 87 12 6

L. 71 18 $\frac{3}{4}$

It is sometimes best to join some of the pence with the farthings in the calculation. Thus, in Ex. 2. we reckon the value at 6d. and at 3 halfpence, which makes $7\frac{1}{2}$ d.

If the rate be $1\frac{1}{2}$ d. which is an eighth part of a shilling, the value is found in shillings, by dividing the quantity by 8.

- | | |
|-------------------------------|-----------------------------------|
| 1. 4572 at $3\frac{1}{2}$ d.? | 7. 7463 at $3\frac{1}{2}$ d.? |
| 2. 7692 at $5\frac{1}{4}$ d.? | 8. 86432 at $4\frac{1}{2}$ d.? |
| 3. 459 at $7\frac{1}{2}$ d.? | 9. 379626 at $3\frac{1}{2}$ d.? |
| 4. 479 at $4\frac{1}{4}$ d.? | 10. 546325 at $2\frac{1}{4}$ d.? |
| 5. 8754 at $2\frac{1}{2}$ d.? | 11. 793943 at $9\frac{1}{2}$ d.? |
| 6. 574 at $1\frac{1}{4}$ d.? | 12. 145872 at $11\frac{1}{2}$ d.? |

§ 101. CASE VI. When the rate consists of shillings and lower denominations,

METHOD I. Multiply the quantity by the shillings, and find the value of the pence and farthings, from the proportion which they bear to the shillings. Add and reduce.

Ex. 1 st . 4258 at 17s. 3d.	Ex. 2 ^d . 5482 at 12s. $4\frac{1}{2}$ d.
17	12
29866	12s. 65784
4258	3d. $=\frac{1}{4}$ of 1s. 1370 6
72386	$1\frac{1}{2}$ d. $=\frac{1}{2}$ of 3d. 685 3
17s. 3d. $=\frac{1}{4}$ of 1s. 1064 6	12s. $4\frac{1}{2}$ d. 67839 9
73450 6	L. 3391 19 9
L. 3672 10 6	

§ 102. METHOD II. Divide the rate into aliquot parts of a pound; calculate the values corresponding to these, as directed in Case I. and add them.

s. d.	s. d.
Ex 1 st . 3894 at 17 6.	Ex. 2 ^d . 1765 at 9 2
10s. $=\frac{1}{2}$ L. 1947	6s. 8d. $=\frac{1}{3}$ L. 588 6 8
5 $=\frac{1}{4}$ 973 10	2 6 $=\frac{1}{8}$ 220 12 6
2 6d. $=\frac{1}{8}$ 486 15	9s. 2d. L. 808 19 2
17s. 6d. L. 3407 5	

§ 103. Sometimes part of the value is more readily obtained from a part already found; and sometimes it is easiest to calculate at a higher rate, and subtract the value at the difference.

s. d.	s. d.
Ex. 3 ^d . 63790 at 5 4	Ex. 4 th . 3664 at 14 9
4s. $=\frac{1}{5}$ L. 12758	10s. $=\frac{1}{2}$ L. 1832
1s. 4d. $=\frac{1}{3}$ of 4s. 4252 13 4	5s. $=\frac{1}{4}$ of 10s. 916
5s. 4d. L. 17010 13 4	15s. 2748
	3d. $=\frac{1}{10}$ of 5s. 45 16
	14s. 9d. L. 2702 4

§ 104. METHOD III. *If the price contain a composite number of pence, we may multiply the value at a penny by the component parts.*

Ex. 5628 at 2s. 11d. or 35d.

$$\begin{array}{r} 12)5628 \\ 20)469 \\ \text{L. } 23 \quad 9 \\ \quad 5 \end{array}$$

$$\begin{array}{r} \text{L. } 117 \quad 5 \\ \quad 7 \end{array}$$

$$\text{L. } 829 \quad 15$$

- | | |
|-----------------------|------------------------|
| 1. 13736 at 14s. 7d. | 11. 53279 at 15s. 4d. |
| 2. 12264 at 17s. 2d. | 12. 45798 at 12s. 9d. |
| 3. 3973 at 11s. 1d. | 13. 50305 at 9s. 9d. |
| 4. 1546 at 13s. 1d. | 14. 7493 at 10s. 8d. |
| 5. 1574 at 9s. 10d. | 15. 3758 at 12s. 10½d. |
| 6. 13078 at 7s. 5½d. | 16. 7643 at 13s. 3½d. |
| 7. 74693 at 3s. 6d. | 17. 56743 at 18s. 6d. |
| 8. 7963 at 17s. 4½d. | 18. 73265 at 13s. 7d. |
| 9. 42693 at 17s. 10d. | 19. 15948 at 12s. 2d. |
| 10. 2307 at 19s. 9d. | 20. 17632 at 11s. 5½d. |

§ 105. CASE VII. *When the rate consists of pounds and lower denominations,*

METHOD I. *Multiply by the pounds, and find the value of the other denominations from the proportion which they bear to the pounds.*

Ex. 543 at L. 2 : 5 : 10½.

$$\begin{array}{r} \text{L. } 2 \qquad \qquad \qquad 1086 \\ 5s. = \frac{1}{4} \text{ of L. } 1 \quad 135 \quad 15 \\ 10d. = \frac{1}{8} \text{ of } 5s. \quad 22 \quad 12 \quad 6 \\ \frac{1}{2}d. = \frac{1}{16} \text{ of } 10d. \quad 1 \quad 2 \quad 7\frac{1}{2} \end{array}$$

$$\text{L. } 1245 \quad 10 \quad 1\frac{1}{2}$$

§ 106. METHOD II. *Reduce the pounds to shillings, and proceed as in Case VI.*

Ex.

Ex 1st. 3592 at L. 3:12:8

$$\begin{array}{r} 72 \quad 20 \\ \hline 7184 \quad 72 \\ \hline 25144 \end{array}$$

258624

At 45s.

At

1d. = $\frac{1}{12}$ s.4d. = $\frac{1}{3}$ s. 1197 44d. = $\frac{1}{3}$ s. 1197 48d. 261018 8
L. 13050 18 8Ex. 2^d. 3683 at L. 2:4:11

$$\begin{array}{r} 45 \\ \hline 18415 \\ \hline 14732 \end{array}$$

165735

307 11

165427 1

L. 8271 7 1

1. 728 at L. 3 5 $6\frac{1}{2}$

2. 43782 4 8 8

3. 72564 12 14 $7\frac{1}{2}$

4. 237 4 16 8

5. 34852 4 9 $4\frac{1}{2}$ 6. 7283 1 15 $7\frac{1}{2}$

7. 6542 at L. 3 12 4

8. 56743 3 15 6

9. 17364 4 16 $4\frac{1}{2}$

10. 14692 5 5 5

11. 786 9 3 $5\frac{1}{2}$

12. 12864 7 5 8

§ 107. The learner should at first try every calculation more ways than one; which will not only serve the purpose of proving the operation, but will render him expert at discovering the best method for solving each question, and will lead him to invent other methods; for we have not exhausted the subject.

Thus, if the number of articles be 20, each shilling of the rate makes a pound of the amount. If it be 12, each penny of the rate makes a shilling of the amount. If 240, each penny of the rate makes a pound of the amount. If 480, each halfpenny makes a pound. If 960, each farthing makes a pound. If the number of articles be a multiple, or an aliquot part of any of these, the amount is easily calculated. And, if it be near to any such number, we may calculate for that number, and add or subtract for the difference.

§ 108. CASE VIII. *When the quantity contains a fraction, work for the integers by the preceding rules, and for the fraction take proportional parts.*

Ex. 1st. 3765 $\frac{1}{4}$ yds. at 4s. 6d.

$$\begin{array}{r} 4 \\ \hline \text{At 4s.} \quad 15060 \\ \text{6d.} \quad 1882 \quad 6 \\ \frac{1}{4} \text{ yd.} \quad 2 \quad 3 \\ \frac{1}{4} \text{ yd.} \quad 1 \quad 1\frac{1}{2} \\ \hline 16945 \quad 10\frac{1}{2} \\ \text{L. 847 } 5 \quad 10\frac{1}{2} \end{array}$$

Ex. 2^d. 3842 $\frac{2}{5}$ yds. at 8s.

$$\begin{array}{r} 8 \\ \hline 30736 \\ \frac{8}{10} \text{ or } \frac{1}{5} \text{ yd.} \quad 4 \quad 6 \\ \frac{1}{10} = \frac{1}{5} \text{ of } \frac{1}{5} \\ \hline 30740 \quad 6 \\ \text{L. 1537}-6 \end{array}$$

CHAP. VII. RULES FOR PRACTICE.

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- | | |
|----------------------------------|--|
| 1. $537\frac{1}{2}$ at L. — 16 8 | 5. $1375\frac{1}{8}$ at L. 2 12 6 |
| 2. $2543\frac{3}{4}$ 2 5 8 | 6. $1723\frac{1}{4}$ 1 6 6 |
| 3. $373\frac{1}{4}$ 5 13 4 | 7. $93852\frac{1}{2}$ 11 9 $\frac{1}{2}$ |
| 4. $267\frac{1}{16}$ 14 7 | 8. $654\frac{1}{8}$ 1 3 $10\frac{1}{2}$ |

§ 109. When the quantity is expressed in several denominations, and the rate given for the higher; calculate the higher; consider the lower one as fractions, and work by the last rule.

When the rate is given for the lower denomination, reduce the higher denominations to the lower.

Ex. 1st. What is the rent of 12 acres 3 roods 20 poles, at 7s. 6d. per acre?

12 acres at 7s. 6d.

$5s. = \frac{1}{4} L.$ 3
 $2s. 6d. = \frac{1}{2}$ of 5s. 1 10
 2 rood $= \frac{1}{2}$ acre 3 9
 1 rood 1 $10\frac{1}{2}$
 20 poles $= \frac{1}{2}$ rood 11 $\frac{1}{4}$

L. 4 16 $6\frac{1}{4}$

Here we take the half of the rent of an acre for the rent of 2 roods; half of that for one rood; and half of that for 20 poles.

Ex. 2d. What is the value of 3 cwt. 2 qr. 9 lb. at 18s. 4d.?

C.
 3 at 18s. 4d.
 18 9
 ————— s d.
 54 112 165 (1 $5\frac{1}{2}$
 $4d. = \frac{1}{4}s.$ 1
 $2q. = \frac{1}{2} C.$ 9 2
 9lb. 1 $5\frac{1}{2}$
 —————
 95 $7\frac{1}{2}$
 L. 3 5 $7\frac{1}{2}$

Here, in order to obtain the price of 9lb. we find that of 9 cwt. and divide it by 112.

Note 1st. 7 lb. 14 lb. and 21 lb. are aliquot parts of 1 qr.; and 16 lb. is $\frac{1}{4}$ of 1 Cwt.; and are therefore easily calculated.

2d. If the price of a dozen be so many shillings, that of an article is as many pence; and, if the price of a gross be so many shillings, that of a dozen is as many pence.

3d. If the price of a ton or score be so many pounds, that of 1 cwt. or a single article, is as many shillings.

4th, Though a fraction less than a farthing is of no consequence, and may be rejected, as is done in Ex. 2d. the learner must be careful lest he lose more than a farthing, by rejecting several remainders in the same calculation.

Cwt.

Cwt. q. lb.

1. 13 1 21 at L. 4 7 8 per C.
2. 8 2 12 at 3 5 6
3. 135 2 17 at 12 4
4. 3 lb. 9 oz. 12 dwt. at 15s. per lb.
5. 8 qrs. 3 bush. at 22s. 6d. per qr.
6. 15 lb. 8 oz. Troy, at 5s. 7d. per oz.
7. 100 acres, 2 r. 25 p. at 25s. per acre.
8. 3 a. 2 r. 18 p. at 4s. 3d. per pole.

SECT II. DEDUCTIONS on WEIGHTS, &c.

§ 110. The full weight of any merchandise, together with that of the cask, box, or other package, in which it is contained, is called the **GROSS WEIGHT**.

TARE is the allowance for the weight of the package: the remainder, when other deductions are to be made, is called **SUTTLE**.

TRET is an allowance of 4 lb. on 104, granted on goods on which there is waste, in order that the weight may answer when the goods are retailed.

CLOFF, is a further allowance granted on some goods in London, of 2 lb. on every 3 C. to turn the scale in favour of the purchaser.

When all deductions are made, the remainder is called **NETT WEIGHT**. The method of calculating these will appear from the following examples:

Ex. 1st. What is the nett weight of 17 C. 2 q. 14 lb. tare 18 lb. per cwt.?

	C. q. lb.		C. q. lb.
	17 2 14 gros.	or,	17 2 14
			6
16 lb. = $\frac{1}{7}$ C.	2 2 2		
2 lb. = $\frac{1}{8}$ of 16 lb.	1 7 $\frac{1}{4}$		105 3 —
			3
18 lb.	2 3 9 $\frac{1}{4}$ tare.		
			317 1
	14 3 4 $\frac{1}{2}$ nett.	28)	317 $\frac{1}{4}$ lb. C. q. lb.
		4)	11 9 $\frac{1}{4}$ (2 3 9 $\frac{1}{4}$ tare.

In the first method, we add the tare at 16 lb. which is $\frac{1}{7}$ of the gross weight to the tare, at 2 lb. which is $\frac{1}{8}$ of the former. In the second, we multiply the gross weight by 18; the tare is 1 lb. for each cwt. of the product, and is reduced, by division, to higher denominations.

Ex.

Ex. 2d. What is Tret of 158 C. 2 q. 24 lb.?

C. q. lb. C. q. lb.
26) 158 2 26 (6 — 11 Tret.

156

—

2

4

—

10

28

—

286

286

—

0

Ex. 3d. What is the cloff on 28 C. 2 q.?

C. q.

28 2

2

—

3) 57 (19 lb.

Ex. 4. What is the tare of 3 C. 1 qt. 11 lb. at 8 lb. on 100 lb.?

C. qr. lb.

3 1 11 = 375 lb.

300 lb. tare 24 lb.

50

4

25

2

—

375 tare 30 lb.

Here we multiply the hundred lb. by 8, and take proportional parts of 8 for the other lbs.

Questions for practice.

1. What is the tare and nett weight of 375 C. 3 q. 21 lb. at 24 per C.?

2. What is the tret on 28 C. 1 q. 8 lb.?

3. What is the cloff on 30 C. 2 q. 14 lb.?

4. What is the nett weight of 444 C. 3 q. 12 lb. deducing tare at 12 lb. per C. and the usual tret and cloff?

5. What is the nett weight of 672 C. 3 q. 14 lb. tare 18 lb. per C.?

6. What is the tret of 364 C. 2 q. 11 lb.?

7. What is the nett weight of 442 C. 27 lb. deducing tare at 12 lb. per 100 lb. and the usual tret and cloff?

8. How many stones iron should be charged for 7492 lb. allowing one stone to the score?

9. A merchant importing 1584 gallons wine filled, is allowed, in charging the duties, 12 gallons on each hundred. How many must he pay duty for?

10. A gentleman lets a farm of $562\frac{1}{2}$ acres, at so much per acre, but agrees to deduce 2 acres in the hundred from the measure for inclosures. How much should he charge rent for?

SECT III. COMMISSION, &c.

§ 111. It is frequently required to calculate allowances on sums of money, at the rate of so much per L. 100. Of this kind is COMMISSION, or the allowance due to a factor for buying or selling goods, or transacting any other business; PREMIUM of INSURANCE, or allowance given for engaging to repay one's losses at sea, or otherwise; EXCHANGE, or the allowance necessary to be added or subtracted for reducing the money of one place to that of another; PREMIUMS on STOCKS, or the allowance given for any share of a public stock above the original value. All these, and others of a like kind, are calculated by the following

Rule. *Multiply the sum by the rate, and divide the product by 100. If the rate contain a fraction, take proportional parts.*

Ex. What is the commission on L. 728, at $2\frac{1}{4}$ per cent. ?

728	100)2002
2	20
2 per cent. 1456	40
$\frac{1}{2}$ 364	12
$\frac{1}{4}$ 182	480
2002	4 Ans. L. 20 0 4 $\frac{3}{4}$
	320

§ 112. When the rate is given in guineas, which is common in cases of insurance, you may add a twentieth part to the sum before you calculate. Or you may calculate at an equal number of pounds, and add a twentieth part to the answer.

§ 113. When the given sum is an exact number of ten pounds, the calculation may be done without setting down any figures. Every L. 10, at $\frac{1}{2}$ per cent. is a shilling; and at other rates in proportion. Thus, L. 170, at $\frac{1}{2}$ per cent. is 17 s.; and, at $\frac{1}{4}$ per cent. 8s. 6d.

- | | |
|--|------------------------------------|
| 1. L. 832 — — at $2\frac{1}{2}$ percent. | 7. L. 487 — — at $\frac{5}{100}$ |
| 2. 767 10 — at $1\frac{3}{4}$ | 8. 265 — — at $3\frac{1}{4}$ Gs. |
| 3. 1436 — — at $\frac{1}{4}$ | 9. 750 — — at $1\frac{1}{2}$ Gs. |
| 4. 546 13 4 at $3\frac{3}{4}$ | 10. 7564 — — at $2\frac{1}{2}$ Gs. |
| 5. 764 4 2 at $\frac{1}{2}$ | 11. 795 — — at $3\frac{1}{2}$ Gs. |
| 6. 455 — — at $3\frac{1}{4}$ | 12. 365 — — at 16 Gs. |

SECT. IV. INTEREST.

§ 114. Interest is the allowance given for the use of money by the borrower to the lender. This is computed at so many pounds for each hundred lent for a year, and a like proportion for a greater or a less time. The highest rate is limited by our laws to 5 per cent. which is called the legal interest, and is due on all debts constituted by bill, which are not paid at the proper term, and is always understood when no other rate is mentioned.

§ 115. The interest of any sum for a year, at any rate, is found by the method explained in the last section.

The interest of any number of pounds for a year, at 5 per cent. is one twentieth part, or an equal number of shillings. Thus, the interest of L. 34675 for a year is 34675 shillings.

The interest for a day is obtained by dividing the interest for a year, by the number of days in a year. Thus, the interest of L. 34675 for a day, is found by dividing 34675 shillings by 365, and comes to 95 shillings.

The interest for any number of days is obtained by multiplying the daily interest by the number of days. Thus, the interest of L. 34675 for 17 days, is 17 times 95 shillings, or 1615 shillings; and this divided by 20, in order to reduce it, comes to L. 80, 15s.

It answers the same purpose, and is easier to multiply at first by 17, the number of days; and, instead of dividing separately by 365, and by 20, to divide at once by 7300, the product of 365 multiplied by 20; and this division may be facilitated by the table inserted § 61.

§ 116. The following practical rules may be inferred from the foregoing observations:

Rule I. *To calculate interest at 5 per cent. multiply the principal by the number of days, and divide the product by 7300.*

Rule II. *To calculate interest at any other rate; find what it comes to at 5 per cent. and take a proper proportion of the same for the rate required.*

Ex. 1. Interest on L. 34675 for
17 days, at 5 per cent.

$$\begin{array}{r}
 34675 \\
 17 \\
 \hline
 242725 \\
 34675 \\
 \hline
 \text{L. s.} \\
 73|00)5894|75(80 \ 15 \\
 584 \cdot \\
 \hline
 5475 \\
 20 \\
 \hline
 1095|00 \\
 73 \\
 \hline
 365 \\
 365 \\
 \hline
 0
 \end{array}$$

Ex. 2. Interest on 304:3:4 for
8 days, at 4 per cent.

$$\begin{array}{r}
 \text{L. 304} \quad 3 \quad 4 \\
 \quad \quad \quad 8 \\
 \hline
 \text{s. d.} \\
 73|00)2433 \quad 6 \quad 8)6 \quad 8. \\
 20 \\
 \hline
 486|66 \\
 438 \\
 \hline
 4866 \\
 12 \\
 \hline
 584|00 \\
 584 \\
 \hline
 0 \\
 \text{Int. at 5 per cent. L. —} \quad 6 \quad 8 \\
 \text{Deduce } \frac{1}{5} \quad \quad \quad \text{—} \quad 1 \quad 4 \\
 \hline
 \text{Int. at 4 per cent. L. —} \quad 5 \quad 4
 \end{array}$$

- Qu. 1. What is the interest of L. 145 for 96 days, at 5 per cent.?
2. — Of L. 173, for 64 days, at ditto?
 3. — Of L. 143 for 65 days, at 4 per cent?
 4. — Of L. 811 for 42 days, at $4\frac{1}{2}$ per cent?
 5. — Of L. 736, from 19th May to 12th Nov. at 5 per cent.?
 6. — Of L. 352, from 17th June 1772 to 16th September 1773, at 4 per cent?
 7. — Of L. 686 for 697 days, at $3\frac{1}{2}$ per cent?
 8. — Of L. 736 : 17 : 6 for 56 days, at 5 per cent?
 9. — Of L. 1434 for 32 days, at 5 per cent.?
 10. — Of L. 847 for 48 days, at ditto?
 11. — Of L. 649 for 112 days, at ditto?
 12. — Of L. 7583 for 29 days, at ditto?
 13. — Of L. 394 for 126 days, at ditto?
 14. — Of L. 276 for 32 days, at $4\frac{1}{2}$ per cent.?
 15. — Of L. 725, from 17th June 1768 to 13th March 1772, at 4 per cent.?
 16. — Of L. 345, from 3d March to 10th June, at $4\frac{1}{2}$ per cent.?

If the time be greater than a year, it is best to calculate the interest for the years, and for the odd days, separately, and add them.

§ 117. When partial payments are made, we proceed in the following manner : Let us suppose a bill of L. 170 was due 12th August, that L. 54 was paid on the 18th September, L. 56 on the 17th October, and the balance on the 14th November ; and let it be required to find how much interest is due.

	Days.		
Aug. 12. L. 170	37	1190	
Sept. 18. pd. 54		510	
			6290
116	29	1044	
Oct. 17. pd. 56		232	
			3364
60	28		1680
Nov. 14. pd. 60			
0			
		7300)	11334(L. 1 : 11 : $\frac{1}{2}$)

Here we subtract the several payments from the original sum in their order, placing the dates in the margin ; and from this it appears that there is interest due on L. 170 from 12th August to 18th September, on L. 116 from 18th September to 17th October, and on L. 60 from 17th October to 14th November. We next compute the number of days in each of these periods, and mark it against the respective sum. Then we multiply each sum by the number of days ; reserving a column, when necessary, for the products of the several figures in the multiplier. Lastly, we add these products, and divide their sum by 7300.

§ 118. Interest on current accounts is calculated nearly in the same manner. For example, let the interest due on the following account be required to 31st July, at 4 per cent. ?

Dr Mr A. Baird, his accompt-current with W. Neill, Cr.

1775.				1775.			
Jan. 15.	To cash	L. 160		Mar. 22.	By cash	L. 50	
Mar. 12.	To ditto	36		May 16.	By ditto	37	
June 23.	To ditto	13	4	6	June 15.	By ditto	25 12 6
July 19.	To ditto	26	13	4	28.	By ditto	32 5 4

1775.		L.	s.	d.	Days		
Jan. 15.	Dr.	160			56	960	
Mar. 12.	Dr.	36				800	
							8960
	Dr.	196			10	1960	Jan. 16
22.	Cr.	50					Feb. 28
							Mar. 31
	Dr.	146			55	730	Apr. 30
May 16.	Cr.	37				730	May 31
							June 30
	Dr.	109			30	8030	July 31
June 15.	Cr.	25	12	6		3270	
							Days 197
	Dr.	83	7	6	8	667	
23.	Dr.	13	4	6			
	Dr.	96	12		5	483	
28.	Cr.	32	5	4			
	Dr.	64	6	8	21	64	
July 19.	Dr.	26	13	4		1287	
							1351
31.		91			12	1092	
					197	7300	25813 (L. 3 10 8½ at
							Deduce ⅔ part - 14 1½

Interest at 4 per cent. L. 2 16 7

Here

Here the sums on either side of the accompt are introduced according to the order of the dates. Those on the Dr side are added to the former balance, and those on the Cr side subtracted. Before we calculate the days, we try if the last sum L. 91 be equal to the balance of the accompt, which proves the additions and subtractions; and, before multiplying, we try if the sum of the column of days be equal to the number of days, from 15th January to 31st of July.

In the 5th and 6th multiplications, we begin at the pence-column, and take in the carriage. In the 7th, instead of multiplying the 6s. 8d. by 21, we add the third part 21 to the product, because 6s. 8d. is the third of a pound. This is done by marking down the second line 1287 instead of 1280. As the computation on the odd shillings and pence is troublesome, and gives a very small increase of the interest, some neglect them altogether; others add one to the pound when the shillings exceed 10, and neglect them when below it.

§ 119. *Ex. 2d.* Required interest on the following accompt to 31st December, allowing 5 per cent. when the balance is due to J. T. and 4 per cent. when due to N. W.

Dr. Mr J. T. his accompt current with N. W. Cr.

Dec. 31. To balance L. 150	April 9. By cash	L. 70
Mar. 12. To cash 120	May 12. By cash	300
June 17. To cash 165	June 3. By cash	240
Sept. 24. To cash 242	Aug. 2. By cash	10
Oct. 9. To cash 178		

In this accompt, the balance is sometimes due to the one party, sometimes to the other. At the beginning, there is a balance due to N. W.; and, on the 9th of April, there is L. 200 due him. On the 12th of May, I. T. pays him L. 300, which discharges what he owed, and leaves a balance of L. 100 due him. The balance continues in I. T's favour till the 24th of September, when N. W. pays L. 242. These changes are distinguished by the marks Dr and Cr. The products are extended in different columns, and divided separately.

		L.			Days		
1775.							
Dec. 31.	Dr.	150			71	150	
1776.						1050	
Mar. 12.	Dr.	120					10650
						2160	
	Dr.	270			28	540	
April 9.	Cr.	70					7560
	Dr.	200			33		6600
May 12.	Cr.	300					
	Cr.	100			22		2200
June 3.	Cr.	240					
	Cr.	340			14	1360	
17.	Dr.	165				340	
							4760
	Cr.	175			46	1050	
Aug. 2.	Cr.	10				700	
							8050
	Cr.	185			53	555	
Sept. 24.	Dr.	242				925	
							9805
	Dr.	57			15	285	
Oct. 9.	Dr.	178				57	
							855
Dec. 31.	Dr.	235			83	705	
						1880	
					365		19505
						7300	45170
							24815

Interest due to N. W. at 5 per cent. L. 6 3 9
 Deduce $\frac{1}{5}$ - - - 1 4 9

Due to N. W. at 4 per cent. L. 4 19 4
 Due to J. T. at 5 per cent. 3 7 11 $\frac{1}{2}$

Balance due to N. W. - L. 1 11 $\frac{1}{2}$

Qu.

Qu. 1. Required the Interest on L. 378, due 12th May, of which L. 10 was paid on the 12th of June; L. 12, 17th August; L. 158, 19th September; L. 47, 18th October; and the balance 23d November?

2. On a bill of L. 158, due 19th September 1773, of which L. 25 was paid 13th October; L. 17, 19th November; L. 45, 18th January 1774; L. 27, 15th March; and the balance, 30th April?

3. On a bill of 640, due 19th July; of which L. 40 was paid the first day of each month, till the whole was paid up?

4. On a bill of L. 60, due on Monday 1st January; of which L. 5 was paid every Monday, till the whole was paid up?

5. James Hill received from M. Bruce L. 368 on the 15th June. Paid him, 12th July, L. 70; and, 18th ditto, L. 140. Received, 1st August, L. 95: 10s. and, 15th August, L. 83: 15s. Paid, 12th September, L. 62: 5s.; and, 19th ditto, L. 23; and, 2d October, L. 65. Received, 1st November, L. 380. Paid, 30th November, L. 300. And cleared accompts, 31st December. Required the legal interest?

6. Thomas Vernon owed James Cox L. 150 on the 31st December 1772. He paid him on the 19th February L. 75; and 14th March L. 245: 9s.; and 12th June L. 176; and 28th July L. 73: 11s. and 30th ditto L. 86: 3s.; and 21st August L. 140; and 19th September L. 45: 2s. He also received from him, 31st March, L. 200; and 12th May L. 360.; and 18th August L. 320; and, 12th October L. 76: 5s.; and, 19th November, L. 19. Required a state of the accompt, and interest to 31st December 1773, allowing 5 per cent. when the balance is due to Cox, and 3 per cent. when due to Vernon?

§ 120. When payments are made on constituted debts, at considerable distances of time, it is usual to calculate the interest to the date of each payment, and add it to the principal, and then subtract the payment from the amount.

Ex. A bond for L. 540 was due 18th August 1772; and there was paid 19th March 1773 L. 50; and 19th December 1773 L. 25; and 23d September 1774 L. 25; and 18th August 1775 L. 110. Required the interest and balance due on the 11th November 1775?

L.

A bond

A bond due 13th August 1772,	-	-	-	L. 540	0	0
Interest to 19th March 1773, 218 days,	L. 16	2	6	16	2	6
Paid 19th March 1773,	-	-	-	L. 556	2	6
				50	0	0
Balance due 19th March 1773,	-	-	-	L. 506	2	6
Interest to 19th December 1773, 275 days,	19	1	2	19	1	2
				L. 525	3	8
Paid 19th December 1773,	-	-	-	25	0	0
Balance due 19th December 1773,	-	-	-	L. 500	3	8
Interest to 23d September 1774, 278 days,	19	0	9	19	0	9
				L. 519	4	5
Paid 23d September 1774,	-	-	-	25	0	0
Balance due 23d September 1774,	-	-	-	L. 494	4	5
Interest to 18th August 1775, 329 days,	22	5	3	22	5	3
				L. 516	9	8
Paid 18th August 1775,	-	-	-	110	0	0
Balance due 18th August 1775,	-	-	-	L. 406	9	8
Interest to 11th Nov. 1775, 85 days,	4	14	6	4	14	6
Balance due 11th November 1775,				L. 411	4	2
Amount of the interest,	L. 81	4	2			

Qu. 1. A bond for L. 1000 being due 15th May 1766, there was paid on the 12th February 1767 L. 200; on the 19th June 1768 L. 250; on the 31st August 1769 L. 150; and on the 11th November 1771 L. 100. Required the balance due 31st December 1772, with interest at 4 per cent.?

2d. An estate was bought for L. 3000, payable, one half at Whitsunday, and the other at Martinmas 1765; however, it was only paid in five equal portions of L. 600 each, on 15th August 1765, 10th March and 12th July 1766, 9th January 1767, and 3d May 1769. Required the interest?

§ 121. *Discount or rebate* is the allowance which ought to be deducted from a debt due at a future period in consideration of receiving present payment. The remainder or present value is the sum which, at the rate of interest proposed, would amount to the value of the debt upon the day when it is payable.

RULE.

RULE. *As the amount of L. 100 for the given rate and time is to the interest of L. 100 for the same, so is the debt to the discount: Or, as the amount of L. 100 to L. 100, so is the interest to the present value.*

Qu. 1. How much ready money is equivalent to L. 100 due at the end of 90 days, interest at 4 per cent.?

2. How much is equivalent to L. 463, due at the end of 219 days, interest 5 per cent.?

3. How much is equivalent to L. 100 due at the end of ten years?

§ 122. The time may be computed when the principal, interest, (or amount), and rate are given; or the rate when the principal, interest, and time is given. As the method of working these cases is easily inferred from the general principles of calculation, we shall leave it as an exercise for the learner's invention.

Qu. 1. In what time will L. 70 amount to L. 100 at $4\frac{1}{2}$ per cent.?

2. At what rate of interest will L. 100 amount to L. 101 : 12s. in 146 days?

We defer the consideration of compound interest till we have explained the principles of Algebra and use of Logarithms.

§ 123. *Equation of payments* is the determination of the time at which a debt due at two or more times may be discharged at once, without disadvantage to either party.

Common Rule. Multiply each payment by the time at which it is due; divide the sum of the products by the amount of the debt, the quotient is the time of equated payment.

Qu. 1. I owe L. 100 payable in 50 days, and L. 150 payable in 90 days: at what time should I pay the whole together?

2. I owe L. 50 payable at 30 days, L. 60 at 40 days, L. 80 at 60 days, and L. 100 at 100 days: required the time of equated payment?

§ 124. MISCELLANEOUS QUESTIONS.

I. A gentleman buys 720 acres land at L. 12 per acre, and incloses them at 8d. per rood; the length of the inclosures being 6420 roods; and he limes 320 acres at the rate of 20 load per acre, for which he pays 4s. 6d. per load. Then he lets 120 acres at 21s.; 250 at 15s.; and 184 at 12s.; and the rest at 10s.; and sells the estate for 25 years purchase. Required the gain or loss?

II. A farm of 60 acres arable land is rented at 30s. per acre. The seed required is $1\frac{1}{4}$ bolls per acre, at 16s. per boll; labour a guinea per acre; other expences L. 12; produce 5 bolls per acre. Required what price per boll will indemnify the tenant?

III. A shopkeeper buys 12 cwt. 3 qr. sugar, at L. 3 : 14s. per cwt. and begins to retail it at 9d.; but, after selling 2 cwt. 2 qr.

he reduces the price one farthing, and reduces it always a farthing more, after selling a like quantity. Required his gain or loss?

IV. A merchant buys 412 bolls wheat at L. 1:0:4 $\frac{1}{2}$; 163 at 18s. 9d.; 207 at 19s. 4 $\frac{1}{2}$; 119 at 19s. 10d.; and 74 at 19s. 2d. The wastage, while in his custody, is 2 per cent. and the lost-rent and other charges L. 6:10s. He sells one third of it at 20s. 6d.; one third at 20s.; and one third at 19s. 6d. Required his gain or loss?

V. A merchant imports 70 pieces German linen, qt. 23 yards each prime cost, drawn on Holland f. 1624, at 23 d. per f.; freight 4 d. per piece, duty 3 d. per yard, deducting 10 per cent.; insurance L. 5:5s.; and other charges 19s. 3d. Required the price per yard?

VI. A manufacturer buys 30 matts flax, weighing each 104 lb. at f. 23 per matt, and 2s. $\frac{1}{2}$ d. per f. The expence of dressing is L. 5:4s. There is $\frac{1}{10}$ of the weight lost in dressing; and it yields 76 stons 2 lb. tow, at 4d. per lb. and three kinds of dressed flax: the best at 1s. 1d. the second at 1s. and the third at 9d.; and, for every lb. of the best there are three of the second, and 2 of the third. Required the gain or loss?

VII. A person can purchase coals at 6s. 4d. per load, at a place where the carriage will cost 3s. 2d. per load, or he can purchase them at 7s. 9d. per load at a sea-port, and can freight a sloop that carries 150 loads for L. 10. Required which is cheapest, and the difference?

VIII. Required to divide a common of 1652 acres into 5 parts of equal value; supposing 327 acres at 2s. 4d.; 450 at 2s.; 314 at 1s. 6d.; and 561 at 1s.; and allotting the first shares on the most valuable ground?

IX. A house is painted at 9 $\frac{1}{2}$ d. per square yard. The first room is 28 yards round by 3 $\frac{1}{2}$ high; the second 18 by 3 $\frac{1}{2}$; the third 12 by 3 $\frac{1}{2}$; the fourth 14 by 3; and the fifth 10 by 3. The painter uses 16 stone white lead, at 5s. 8d.; 30 pints lintseed oil, at 1s. 3d.; and other materials, value 16s. How much has he for his work?

X. A smith buys 36 stons iron at 3s. 6d. per stone; he makes 7 grates, weighing each 3 stone 2 lb. at 5 $\frac{1}{2}$ d. per lb.; and makes the rest into horse-shoes, weighing each 13 ounces, at 4d. Required how many he will make, allowing 3 ft. 15 lb. 8 oz. to be lost in working, and his gain, reckoning 40 days labour, at 1s. 2d.; fire and other charges 18s.?

XI. The magistrates of a borough propose to bring water from a fountain 2 miles 3 furlongs distant, in a lead pipe, each yard weighing 35 lb. at 2 $\frac{1}{2}$ d. per lb.; expence of carrying and laying the pipe 1s. per yard; cisterns and other charges L. 39:12:11. There are 200 inhabitants, who agree, in consideration of being supplied with water at their houses, to pay as much annually as may

may amount to the interest of the money expended. Required how much each shall pay?

XII. A brewer buys 5 bolls malt at L. 1 : 0 : 9, and 25 lb. hops at 1s. 4d.; he pays for duty L. 2 : 19 : 3; for coals, servants wages, &c. 19s. 8d.; he brews 96 barrels beer. How much does it cost per barrel?

XIII. A hd. lintseed, containing $18\frac{1}{2}$ pecks, being sown, each lippie produces 12 lb. flax, and each lb. is spun into a spindle and a quarter of yarn, which is wove in a 1200 reed. Required how much linen it will make, supposing the woof to require one fifth part less than the warp, and that the linen loses 10 per cent. in manufacturing?

N. B. A spindle contains 48 cuts of 120 threads each, $2\frac{1}{2}$ yards long; and there are two threads in the warp for each split in the reed.

XIV. A county, 30 miles long, and $10\frac{1}{2}$ broad, contains 12 parishes of 700 inhabitants each, and one city of 6000; one fourth of the ground may be reckoned for waste and high-ways; of the remainder, two thirds is pasture, and one third arable; one half of the arable ground is usually sown with wheat, pease, oats, and barley, in rotation, and then rested for 5 years; the other half being improper for wheat, two crops of oats are introduced in the rotation. They sow 3 firlots of wheat or barley, 5 of oats, and 6 of pease per acre, English measure; and reap, at an average, 9 bolls of wheat, 6 of barley, 5 of oats, and 4 of pease. The horses and cattle consume 15 bolls oats, and 5 pease, for every 100 arable acres. Three fourths of the inhabitants of the city, and one fifth of those in the country, use wheat bread, and consume 5 bolls each; the remainder consume 4 bolls of oat-meal, (whereof $14\frac{1}{2}$ pecks are got from each boll of oats,) and $2\frac{1}{2}$ bolls pease. There are 6 bolls barley consumed on each farm of 200 arable acres, and 5000 in the city. Required how much each kind of grain they must purchase from other places, or how much they will have to dispose of?

XV. Required the pay of a regiment for a year, consisting of 10 companies, containing each 78 rank and file, at 8 d. per day; 2 drummers at 1 s. 2 corporals at 1 s. 2 serjeants at 1 s. 6 d. an ensign at 3 s. 8 d. a lieutenant at 4 s. 8 d. and a captain at 10 s.; and the colonel of the regiment 24 s. the lieutenant-colonel at 17 s. the major at 15 s. who also serve as captains to 3 companies; the surgeon at 4 s. chaplain 6 s. 8 d. adjutant 4 s. and quartermaster 4 s. 8 d.?

XVI. The national debt, at the late peace, amounted to L. 148,000,000. Required how long a man would take to tell it in guineas, or shillings, reckoning 200 pieces in a minute for 10 hours a day; also, how many waggons, loaded with 1200 lb. each, would be required to carry it, the weight of a guinea being 5 dwt. 9 gr, and of a shilling 3 dwt. 21 gr.: and how long a train they would form, allowing 40 feet for each waggon and horses; also, how

how far the money would extend in a line, if the pieces were laid close to each other, the diameter of each being an inch, and how much ground it would cover?

XVII. The expence of building a bridge amounted to L. 5000; to defray which, a toll was allowed, of $\frac{1}{4}$ d. each foot-passenger, 1 d. each horse or ox, 2 d. each cart, and 6 d. each chaise. There are 500 foot-passengers, 50 horses, 20 carts, and 12 chaises daily, at an average, and 12000 cattle annually. The expence of collecting the toll is L. 36 : 9 : 7. Required how many per cent. of the original expence the toll amounts to?

XVIII. If the depth of rain that falls annually in Britain be 32 inches, the extent of ground 60000 miles, the number of inhabitants 8 millions, and the quantity of water used by each daily half a gallon. Required what proportion of the whole rain-water they will use? Required also what proportion of the air, within 10 yards of the ground, they will respire in a year, supposing each person to respire an hd. in an hour? N. B. A hd. contains 14553 inches.

XIX. A farmer is offered L. 45 for a field of barley of 9 acres. He expects 9 bolls at 12 s. and 45 stone straw at 2 d. from each acre. The expence of reaping is estimated at 5 s. per acre, threshing 6 d. per boll, and carriage to market 4 s. per load of 6 bolls. He is willing to sell it 5 per cent. cheaper than the expected produce, to save risk. Required his gain or loss by accepting the offer?

XX. A merchant imports 600 quarters wheat, prime cost 35 s. per quarter, freight 3 s. 9 d. per ditto, insurance on L. 1100. at 2 guineas per cent.; other charges L. 19 : 16 s. Required the price per boll, reckoning 196 bolls for 100 quarters?

XXI. If 30 lb. flax, at 1 s. 9 d. be spun into yarn, and every 5 lb. make 6 spindles, and every spindle make $3\frac{1}{2}$ yards linen; expence of spinning 1 s. 2 d. per spindle, of weaving $4\frac{1}{2}$ d. and of bleaching 2 d. per yard. At what price can the manufacturer sell it so as to gain 2 d. on each shilling?

XXII. A farmer raises 72 bolls wheat at 18 s.; 156 bolls oats at 12 s. 6 d.; $87\frac{1}{2}$ bolls barley at 14 s.; 54 bolls pease at 10 s. 6 d.; 125 bolls potatoes, at 6 s.; 3542 stones hay at $4\frac{1}{2}$ d.; and pastures 3 cows at 30 s. He retains one eighth of the wheat, one sixth of the oats, one seventh of the barley, one fourth of the pease, and one twentieth of the potatoes, for seed; and pays the rent of 150 acres, at 25 s.; for manure L. 35; for servants wages and maintenance L. 64; and for other expences L. 42. Required his gain or loss?

XXIII. A prize being taken at sea, viz. a ship sold for L. 500, and cargo, consisting of 150 hds. wine, at L. 15; 1200 gallons brandy at 4 s.; and other goods, value L. 1080; from which there is to be deducted L. 19 for charges, and 5 per cent. on the gross value for agents fee; it is required to divide the nett produce among the officers and crew in the following proportions: Three eighth parts to the captain, one eighth equally among 5 commissioned officers, one eighth

eighth equally among 9 warrant officers, one eighth equally among 19 petty officers, and two eighths equally among 150 private men?

XXIV. A pipe of Madeira wine, which contains at present 54 dozen, may be sold at 36 s. per dozen. If the proprietor keep it two years, he expects to sell it for 41 s. per dozen; but, besides losing the interest of the value, the leakage will be 2 dozen; and the expence of cellar-rent, and charges, will come to 15 s. Required if he will be a gainer by keeping it?

XXV. A farmer raises flax for 10 years on ground rented at 25 s.; the first year he sows 3 hds. at 54 s. 5 d. on 5 acres; expences, besides seed and rent, L. 6; 3 s.; produce 90 stones flax;

		s.	d.		Expences.	Produce.
2d year	2½ hds. at	57	6	on 3½ acres.	L. 5 9 —	66 St.
3d	4	52	8	7	8 4 —	84
4th	3½	62	—	5½	6 2 6	95
5th	2½	55	4	5	6 6 —	58½
6th	6½	58	—	4	5 5 —	144½
7th	5½	65	6	10¾	9 5 6	118
8th	2	51	—	4	5 3 6	96
9th	5	48	—	6½	7 4 6	114
10th	1½	59	—	2½	3 13 3	79

Required the average crop per acre, the average crop per hd. sown, the average quantity seed per acre, the average price of the seed per hd. per acre, and per year, and the average cost of the flax per stone?

XXVI. A grazier has 50 calves, value 12 s. each. If he keep them 3 years, they will cost 5 s. the first year, 10 s. the second, and 15 s. the third, for summer's grafs; and 7 s. 6 d. the first, 12 s. 6 d. the second, and 20 s. the third, for winter feeding; after which the cattle will sell at L. 5. Required the gain or loss, by bringing them up, supposing one to die each summer, another each winter, and allowing simple interest from the end of each year?

XXVII. 2000 copies of an octavo book of 600 pages are printed. The paper costs 12 s. per ream, of 500 sheets; type-work, 1 s. per page; prefs-work, 2 s. 6 d. per ream; other charges at printing 5 s. per sheet; binding, 8½ d. per copy; advertising and incidents, L. 3: 19: 2. Required at what price it must be sold that the editor's profit may be cent. per cent.?

XXVIII. Suppose 12000 puncheons rum be used annually in Britain for punch, at 9 s. per gallon; and that each pint of rum requires ¼ lb. of sugar, at 7 d. per lb. and a lemon at 1½ d. Required the quantity and value of sugar and lemons, the whole value of the punch, and the tonnage of shipping necessary to import the materials, reckoning 8 boxes of 1200 lemons, or 3 puncheons, equal to a ton?

XXIX. Suppose the number of inhabitants in Britain 8 millions; that the quantity of corn necessary to be raised for each, including what is consumed by cattle, and used for seed, 5 quarters; that

that the land, at an average, produces 3 quarters per acre; that 2 horses labour 36 acres; that each horse requires 3 sets of shoes per annum, that each shoe weighs 1 lb. averd.; and that a smith makes 5 sets of shoes in a day, and labours 300 days in the year. Required the number of plough horses; the quantity of iron necessary to supply them with shoes; the number of smiths employed in making them; and the tonnage of shipping, and number of mariners employed in importing the iron, reckoning five mariners for each ship of 100 tons?

XXX. A farmer has 10 acres turnips, drilled in rows at a yard distance; and he finds, by trials in different places, that each yard produces, at an average, 4 turnips of 3 lb. weight. Required how many cattle he should purchase for fattening on the crop, supposing that they require 60 days to fatten, and consume each 90 lb. per day?

XXXI. If the ground allowed for a grave be 8 feet long and 3 broad, how many acres of burial-ground will there be occasion for in Britain, supposing the number of inhabitants 8 millions; whereof 1 in 25 dies annually, and that a grave remains unopened for 12 years?

XXXII. A field of grafs, measuring 12 acres, will yield 212 stones hay per acre, at $4\frac{1}{2}$ d.; the expence of making the hay being L. 3; or, it will fatten 20 oxen, which may be bought for L. 5; and, when fat, will yield each 36 stones beef, at 4s. 3d.; or, it will keep 12 milk-cows for 16 weeks, each of which will yield 5 lb. butter per week, at 8d. and milk to the value of 1s. 9d.; expence of the dairy L. 4: Or, it will pasture 40 horses for 50 days, at 5d. Required which is most profitable?

XXXIII. Required the amount of the house and window-tax in a town containing 8640 inhabitants, reckoning 6 inhabitants to each house; and that one third of the houses have less than 6 windows; one fourth of the remaining ones 6 or 7; one sixth of the remaining ones 8 or 9; three fifths of the remaining ones 10 or 11; one fourth of the remaining ones 12 or 13; one half of the remaining ones 14, 15, or 16; and the remaining ones from 17 to 26; always an equal number of each: The house duty being 1s. per house, and the window duty for 7 windows 2d. each; for 8 windows 6d. each; for 9, 10d.; for 10, 11d.; for 11, 1s.; for 12, 1s. 2d.; for 13, 1s. 4d.; for 14 to 19 inclusive, 1s. 6d.; for 20, 1s. 7d.; for 21, 1s. 8d.; for 22, 1s. 9d.; for 23, 1s. 10d.; for 24, 1s. 11d.; for 25, and all above, 2s. per window? Houses under 6 windows pay no house-tax; and, under 7 windows, no window-tax.

XXXIV. If a cubic foot of coal weigh 70 lb. averd. what extent of coal, 8 feet thick, will be necessary to supply a city of 5000 inhabitants annually, supposing that each family of 5 persons consume, at an average, 42 bushels, weighing 10 stones of 16 lb. averd. per bushel?

XXXV,

XXXV. Light passes from the sun to the earth, whose distance is computed 118,541,428 miles, in about 7 minutes. The earth revolves round the sun in a year (see question 13. in division, §68.), and round its axis in 23 hours 56 minutes, the circuit of the equatorial parts being 24932 miles. A stone, after falling a second, moves at the rate of 32 feet in a second; sound about 1150 feet in a second; a cannon-ball about 7 miles in a minute; a swift horse galloping about a mile in 3 minutes. The hour-hand of a clock goes round the dial-plate circuit three feet in 24 hours. Required the proportions of the velocity of these motions to each other, and the space each passes through in an hour?

XXXVI. There is annually consumed in London 98000 black cattle, 600,000 sheep, 180,000 hogs, 160,000,00 lb. butter, and 20,000,000 lb. cheese, and 5,000,000 gallons milk. Required what extent of ground is required to supply it in these articles, supposing 2 acres for rearing, and the produce of half an acre for fattening each of the cattle; an acre for rearing and fattening 4 sheep; a quarter of grain for fattening each of the hogs, the ground producing, at an average, $3\frac{1}{2}$ quarters; three-fourths of an acre for each milk cow; and that each yields 5 lb. butter, 7 lb. cheese, or 18 gallons milk for 25 weeks?

C H A P. VIII.

V U L G A R F R A C T I O N S.

NOTATION AND REDUCTION.

§ 125. **I**N order to understand the nature of vulgar fractions, we must suppose unity (or the number 1), divided into several equal parts. One or more of these parts is called a fraction, and is represented by placing one number in a small character above a line, and another under it: For example, two fifth parts is written thus, $\frac{2}{5}$. The number under the line (5) shows how many parts unity is divided into, and is called the **DENOMINATOR**. The number above the line (2) shows how many of these parts are represented, and is called the **NUMERATOR**.

§ 126. It follows from the manner of representing fractions, that when the numerator is increased, the value of the fraction becomes greater; but, when the denominator is increased, the value becomes less. Hence we may infer, that if the numerator and denominator be both increased, or both diminished, in the same proportion, the value is not altered; and therefore, if we multiply both by any number whatever, or divide them by any number which measures both, we shall obtain other fractions of equal value. Thus, every fraction may be expressed in a variety of forms, which have all the

same signification. The reason of most of the following rules depends upon this principle.

§ 127. An integer with a fraction annexed, is called a MIXED NUMBER; for example, five and two third parts, or $5\frac{2}{3}$. A fraction, whose numerator is greater than its denominator, is called an IMPROPER FRACTION; for example, seventeen third parts, or $\frac{17}{3}$. Fractions of this kind are greater than unity. Mixed numbers may be represented in the form of improper fractions, and improper fractions may be reduced to mixed numbers, and sometimes to integers. As fractions, whether proper or improper, may be represented in different forms, we must explain the method of reducing them from one form to another, before we consider the other operations.

§ 128. PROBLEM I. *To reduce mixed numbers to improper fractions: Multiply the integer by the denominator of the fraction, and to the product add the numerator. The sum is the numerator of the improper fraction sought, and is placed above the given denominator.*

Ex. $5\frac{2}{3} = \frac{17}{3}$.

5 integer.

3 denominator.

—
15 product.

2 numerator given.

—
17 numerator sought.

1. $423\frac{1}{8}$

2. $375\frac{3}{7}$

3. $642\frac{5}{11}$

4. $465\frac{1}{4}$

5. $189\frac{17}{33}$

6. $225\frac{2}{7}$

7. $312\frac{105}{173}$

8. $784\frac{1}{3}$

9. $1642\frac{6}{11}$

10. $2189\frac{17}{18}$

11. $7932\frac{5}{8}$

12. $317\frac{1}{7}$

13. $19\frac{394}{173}$

14. $99\frac{77}{88}$

§ 129. Because one is equal to two halves, or three third parts, or four quarters, and every integer is equal to twice as many halves, or four times as many quarters, and so on; therefore, every integer may be expressed in the form of an improper fraction, having any assigned denominator; the numerator is obtained by multiplying the integer into the denominator. Hence the reason of the foregoing rule is evident. Five, reduced to an improper fraction, whose denominator is 3, makes $\frac{15}{3}$, and this added to $\frac{2}{3}$, amounts to $\frac{17}{3}$.

§ 130. PROBLEM II. *To reduce improper fractions to whole or mixed numbers: Divide the numerator by the denominator.*

Ex. $\frac{112}{17} = 6\frac{10}{17}$.

17)112($6\frac{10}{17}$

102

—
10

1. $324\frac{9}{10}$

2. $342\frac{1}{12}$

3. $753\frac{6}{27}$

4. $15764\frac{1}{123}$

5. $365\frac{1}{15}$

6. $7404\frac{1}{33}$

7. $8642\frac{1}{33}$

8. $4362\frac{1}{218}$

This problem is the converse of the former, and the reason may be illustrated in the same manner.

§ 131. PROBLEM III. *To reduce fractions to lower terms: Divide both numerator and denominator by any number which measures both, and place the quotients in the form of a fraction.*

Example. $\frac{135}{360} = \frac{27}{72} = \frac{3}{8}$

Here we observe that 135 and 360 are both measured by 5, and the quotients form $\frac{27}{72}$, which is a fraction of the same value as $\frac{135}{360}$ in lower terms. Again, 27 and 72 are both measured by 9, and the quotients form $\frac{3}{8}$, which is still of equal value, and in lower terms.

§ 132. It is generally sufficient in practice, to divide by such measures as are found to answer on inspection, or by the rules given § 57. But if it be required to reduce a fraction to the lowest possible terms, we must divide the numerator and denominator by the greatest number which measures both. What number this is, may not be obvious, but will always be found by the following rule.

To find the greatest common measure of two numbers, divide the greater by the lesser, and the divisor by the remainder continually, till nothing remain; the last divisor is the greatest common measure.

Ex. Required the greatest number which measures 475 and 589?

$$\begin{array}{r}
 475 \overline{)589} 1 \\
 \underline{475} \\
 114 \overline{)475} 4 \\
 \underline{456} \\
 19 \overline{)114} 6 \\
 \underline{114} \\
 0
 \end{array}$$

Here we divide 589 by 475, and the remainder is 114; then we divide 475 by 114, and the remainder is 19; then we divide 114 by 19, and there is no remainder: From which we infer, that 19, the last divisor, is the greatest common measure.

To explain the reason of this, we must observe, that any number which measures two others, will also measure their sum, and their difference, and will measure any multiple of either. In the foregoing example, any number which measures 589 and 475, will measure their difference 114, and will measure 456, which is a multiple of 114; and any number which measures 475 and 456, will also measure their difference 19. Consequently, no number greater than 19 can measure 589 and 475. Again, 19 will measure them both, for it measures 114, and therefore measures 456 which is a multiple of 114, and 475 which is just 19 more than 456; and, because it measures 475 and 114, it will measure their sum 589. To reduce $\frac{475}{589}$ to the lowest possible terms, we divide both numbers by 19, and obtain $\frac{25}{31}$.

If there be no common measure greater than 1, the fraction is already in the lowest terms.

§ 133. If the greatest common measure of 3 numbers be required, we find the greatest measure of the two first, and then the greatest measure of that number, and the third. If there be more numbers, we proceed in the same manner. The learner may try 1080, 945, and 747, and may reduce the following fractions to the lowest terms.

$\frac{45}{375}$	$\frac{306}{240}$	$\frac{145}{800}$	$\frac{271}{420}$	$\frac{712}{2408}$	$\frac{17}{914}$
$\frac{784}{1008}$	$\frac{180}{270}$	$\frac{204}{140}$	$\frac{64}{184}$	$\frac{27}{1710}$	$\frac{20}{48}$
$\frac{225}{333}$	$\frac{374}{418}$	$\frac{268}{410}$	$\frac{200}{481}$	$\frac{266}{364}$	$\frac{1751}{1810}$

§ 134. PROBLEM IV. *To reduce fractions to others of equal value that have the same denominator:*

1st. *Multiply the numerator of each fraction by all the denominators except its own. The products are numerators to the respective fractions sought.*

2d. *Multiply all the denominators into each other; the product is the common denominator.*

Ex. $\frac{4}{3}$ and $\frac{7}{9}$ and $\frac{3}{8} = \frac{188}{360}$ and $\frac{280}{360}$ and $\frac{135}{360}$.

$$4 \times 9 \times 8 = 288 \text{ first numerator.}$$

$$7 \times 5 \times 8 = 280 \text{ second numerator.}$$

$$3 \times 5 \times 9 = 135 \text{ third numerator.}$$

$$5 \times 9 \times 8 = 360 \text{ common denominator.}$$

Here we multiply 4 the numerator of the first fraction by 9, and 3 the denominators of the two others, and the product 288 is the numerator of the fraction sought, equivalent to the first. The other numerators are found in like manner, and the common denominator 360, is obtained by multiplying the given denominators 5, 9, 8, into each other. In the course of the whole operation, the numerators and denominators of each fraction are multiplied by the same numbers, and therefore their value is not altered. Take for practice the numbers given § 137.

§ 135. The fractions thus obtained may be reduced to lower terms, if the several numerators and denominators have a common measure greater than unity. Or, after arranging the number for multiplication, as is done above, if the same number occur in each rank, we may dash them out and neglect them; and, if numbers which have a common measure occur in each, we may dash them out and use the quotients in their stead; or any number which is a multiple of all the given denominators, may be used as a common denominator. A number of this kind will sometimes occur on inspection, and the new numerators are found by multiplying the given numerators

rators by the quotient of the common denominator divided by the given ones.

§ 136. If the articles given for any operation be mixed numbers, they are reduced to improper fractions by Problem I. If the answer obtained be an improper fraction, it is reduced to a mixed number by Problem II.; and it is convenient to reduce fractions to lower terms, when it can be done, by Problem III. which makes their value better apprehended, and facilitates any following operation. The reduction of fractions to the same denominator by Problem IV. is necessary to prepare them for addition or subtraction, but not for multiplication or division.

ADDITION OF VULGAR FRACTIONS.

§ 137. RULE: Reduce them, if necessary, to a common denominator; add the numerators, and place the sum above the denominator.

Ex. 1. $\frac{3}{4} + \frac{1}{2} = \frac{3}{4} + \frac{2}{4} = \frac{5}{4}$ by Problem IV. $= \frac{37}{48}$

Ex. 2. $\frac{5}{7} + \frac{8}{9} + \frac{9}{10} = \frac{45}{63} + \frac{56}{63} + \frac{56}{63} = \frac{157}{63}$ $\frac{450}{560}$
by Problem II. $= 2 \frac{317}{630}$ $\frac{567}{1577}$

The numerators of fractions that have the same denominator signify like parts; and the reason for adding them is equally obvious, as that for adding shillings or any other inferior denomination.

§ 138. Mixed numbers may be added, by annexing the sum of the fractions to the sum of the integers. If the former be a mixed number, its integer is added to the other integers.

- | | |
|--|---|
| 1. $\frac{7}{8} \cdot \frac{3}{5}$ | 7. $\frac{3}{7} \cdot \frac{2}{9}$ |
| 2. $\frac{1}{3} \cdot \frac{6}{15} \cdot \frac{8}{9}$ | 8. $\frac{2}{3} \cdot \frac{3}{7} \cdot \frac{5}{9}$ |
| 3. $\frac{2}{3} \cdot \frac{3}{4} \cdot \frac{5}{6}$ | 9. $\frac{3}{7} \cdot \frac{4}{7} \cdot \frac{7}{9} \cdot \frac{9}{11}$ |
| 4. $\frac{1}{8} \cdot \frac{1}{9} \cdot \frac{1}{10} \cdot \frac{1}{12}$ | 10. $\frac{1}{2} \cdot \frac{1}{3} \cdot \frac{1}{4} \cdot \frac{1}{5} \cdot \frac{1}{6}$ |
| 5. $3\frac{5}{8} \cdot 9\frac{3}{7} \cdot 2\frac{4}{7}$ | 11. $5\frac{1}{12} \cdot 4\frac{3}{4} \cdot 7\frac{5}{9}$ |
| 6. $99\frac{82}{11} \cdot 32\frac{3}{17} \cdot 89\frac{80}{17} \cdot 42\frac{42}{136}$ | 12. $365\frac{12}{161} \cdot 912\frac{9}{11} \cdot 586\frac{6}{88}$ |

SUBTRACTION OF VULGAR FRACTIONS.

§ 139. RULE. Reduce the fractions to a common denominator; subtract the numerator of the subtrahend from the numerator of the minuend, and place the remainder above the denominator.

Ex. Subtract $\frac{2}{7}$ from $\frac{5}{12}$

remainder $\frac{1}{84}$

$\frac{5}{12} = \frac{35}{84}$
 $\frac{2}{7} = \frac{24}{84}$ } by Prob. IV.

from 35
take 24
rem. 11

§ 140. To subtract a fraction from an integer; Subtract the numerator

erator from the denominator, and place the remainder above the denominator; prefix to this the integer diminished by unity.

Ex. Subtract $\frac{2}{3}$ from 12 remainder $11\frac{2}{3}$

To subtract mixed numbers, proceed with the fractions by the foregoing rule, and with the integers in the common method. If the numerator of the fraction in the subtrahend exceed that in the minuend, borrow the value of the denominator, and repay it by adding 1 to the unit-place of the subtrahend.

Ex. Subtract $145\frac{7}{9}$ from $248\frac{3}{5}$.

$$\begin{array}{r} \frac{3}{5} = \frac{27}{45} \\ \frac{7}{9} = \frac{35}{45} \end{array} \left. \vphantom{\begin{array}{r} \frac{3}{5} \\ \frac{7}{9} \end{array}} \right\} \text{by Prob. IV.} \quad \begin{array}{r} 248\frac{27}{45} \\ 145\frac{35}{45} \\ \hline 102\frac{37}{45} \end{array}$$

Here, because 27 the numerator of the fraction in the minuend is less than 35, the numerator of the subtrahend, we borrow 45 the denominator; 27 and 45 make 72, from which we subtract 35, and obtain 37 for the numerator of the fraction in the remainder, and we repay what was borrowed, by adding 1 to 5 in the unit-place of the subtrahend.

The reason of the operations in adding or subtracting fractions will be fully understood, if we place the numerators of the fractions in a column like a lower denomination, and add or subtract them as integers, carrying or borrowing according to the value of the higher denomination.

- | | | | | | |
|-------------|-----------------------|-----------------|-----|-------------------------|-----------------|
| 1. Subtract | $\frac{1}{2}$ from | $\frac{5}{7}$ | 7. | $\frac{3}{9}$ from | $\frac{5}{9}$ |
| 2. | $\frac{2}{3}$ from | $\frac{2}{3}$ | 8. | $\frac{3}{11}$ from | $\frac{2}{3}$ |
| 3. | $\frac{1}{10}$ from | $\frac{3}{4}$ | 9. | $\frac{1}{5}$ from | $\frac{17}{11}$ |
| 4. | $\frac{1}{11}$ from | $\frac{1}{9}$ | 10. | $\frac{301}{308}$ from | $\frac{49}{32}$ |
| 5. | $25\frac{5}{8}$ from | 37 | 11. | $5\frac{135}{112}$ from | $9\frac{3}{8}$ |
| 6. | $36\frac{9}{11}$ from | $45\frac{2}{3}$ | 12. | $37\frac{1}{4}$ from | 51 |

MULTIPLICATION OF VULGAR FRACTIONS.

§ 141. RULE. Multiply the numerators of the factors together for the numerator of the product, and the denominators together for the denominator of the product.

Ex. 1. $\frac{2}{3} \times \frac{5}{7} = \frac{10}{21}$
 $2 \times 5 = 10$ num.
 $3 \times 7 = 21$ den.

Ex. 2. $8\frac{2}{3} \times 7\frac{1}{4} = 130\frac{2}{3} = 65\frac{2}{3}$
 $8\frac{2}{3} = \frac{42}{3}$ by prob. I.
 $7\frac{1}{4} = \frac{28}{4}$ by ditto.
 $42 \times 28 = 1176$
 $5 \times 4 = 20$

To multiply $\frac{2}{3}$ by $\frac{5}{7}$ is the same as to find what two third parts of $\frac{5}{7}$ comes to; if one third part only had been required, it would have been obtained by multiplying the denominator 7 by 3, because the value of fractions is lessened when their denominators are increased;

creased; and this comes to $\frac{5}{11}$; and, because two thirds were required, we must double that fraction, which is done by multiplying the numerator by 2, and comes to $\frac{10}{11}$. Hence we infer, that fractions of fractions, or compound fractions, such as $\frac{2}{3}$ of $\frac{5}{11}$ are reduced to simple ones by multiplication. The same method is followed when the compound fraction is expressed in three parts or more.

§ 142. If a number be multiplied by an integer, its value is increased; if it be multiplied by 1, or taken one time, it undergoes no alteration; if it be multiplied by a proper fraction, or taken for one half, two thirds, or the like, its value is diminished, and the product is less than the number multiplied.

§ 143. The foregoing rule extends to every case, when there are fractions in either factor: for mixed numbers may be reduced to improper fractions, as is done in Ex. 2.; and integers may be written, or understood to be written, in the form of fractions whose numerator is 1. It will be convenient, however, to give some further directions for proceeding, when one of the factors is an integer, or when one or both are mixed numbers.

1st. To multiply an integer by a fraction, multiply it by the numerator, and divide the product by the denominator.

$$\text{Ex. } 3756 \times \frac{1}{3} = 2253\frac{2}{3}$$

$$\begin{array}{r} 5)11268(2253\frac{2}{3} \end{array}$$

2d. To multiply an integer by a mixed number, we multiply it first by the integer, and then by the fraction, and add the products.

$$\text{Ex. } 138 \times 5\frac{1}{4} = 793\frac{1}{2}$$

$$\begin{array}{r} 138 \times 5 = 690 \\ 138 \times \frac{1}{4} \end{array}$$

3

$$\begin{array}{r} 4)414(\end{array}$$

$$103\frac{1}{2}$$

$$793\frac{1}{2}$$

3d. To multiply a mixed number by a fraction, we may multiply the integer by the fraction, and the two fractions together, and add the products.

$$\text{Ex. } 15\frac{3}{8} \times \frac{2}{9} = 3\frac{5}{12}$$

$$15 \times \frac{2}{9} = 3\frac{1}{3} = 3\frac{4}{12}$$

$$\frac{3}{8} \times \frac{2}{9} = \frac{6}{72} = \frac{1}{12}$$

$$3\frac{5}{12}$$

4th. When both factors are mixed numbers, we may multiply each part of the multiplicand, first by the integer of the multiplier, and then by the fraction, and add the four products.

Ex.

Ex. $8\frac{2}{3}$ by $7\frac{1}{2}$

$$\begin{array}{rcl}
 8 & \times & 7 = \\
 8 & \times & \frac{3}{2} = \frac{24}{2} = \\
 \frac{2}{3} & \times & 7 = \frac{14}{1} = 2\frac{4}{1} = \\
 \frac{2}{3} & \times & \frac{3}{2} =
 \end{array}$$

56

6 by prob. II.

$$\begin{array}{r}
 2\frac{16}{30} \\
 \frac{6}{30} \\
 \hline
 2\frac{22}{30}
 \end{array}$$

product $65\frac{2}{30}$ as before.

1. multiply	$\frac{2}{3}$ by	$\frac{2}{3}$	9.	$\frac{3}{4}$ by	$\frac{5}{7}$
2.	$\frac{3}{4}$ by	$\frac{7}{5}$	10.	$\frac{2}{3}$ by	$\frac{5}{8}$
3.	$\frac{10}{11}$ by	$\frac{17}{24}$	11.	$\frac{3}{4}$ by	$\frac{12}{71}$
4.	$\frac{12}{105}$ by	$\frac{73}{108}$	12.	3765 by	$\frac{3}{5}$
5.	7362 by	$\frac{3}{4}$	13.	4764 by	$\frac{5}{8}$
6.	7483 by	$3\frac{3}{4}$	14.	3745 by	$12\frac{2}{5}$
7.	2468 $\frac{2}{3}$ by	$\frac{5}{10}$	15.	13 $\frac{12}{13}$ by	$\frac{5}{13}$
8.	763 $\frac{1}{4}$ by	$19\frac{1}{2}$	16.	$3\frac{3}{7}$ by	$5\frac{2}{3}$

DIVISION OF VULGAR FRACTIONS.

§ 144. RULE. 1st, Multiply the numerator of the dividend by the denominator of the divisor. The product is the numerator of the quotient.

2d, Multiply the denominator of the dividend by the numerator of the divisor. The product is the denominator of the quotient.

Ex. Divide $\frac{2}{3}$ by $\frac{7}{9}$ Quotient $\frac{18}{35}$

$$2 \times 9 = 18$$

$$5 \times 7 = 35$$

To explain the reason of this operation, let us suppose it required to divide $\frac{2}{3}$ by $\frac{7}{9}$, or to take one seventh part of that fraction. This is obtained by multiplying the denominator by 7, for the value of fractions is diminished by increasing their denominators, and comes to $\frac{2}{21}$. Again, because $\frac{2}{21}$ is nine times less than $\frac{2}{3}$, the quotient of any number divided by $\frac{7}{9}$ will be nine times greater than the quotient of the same number divided by $\frac{2}{21}$. Therefore we multiply $\frac{2}{21}$ by 9, and obtain $\frac{18}{35}$.

If the divisor and dividend have the same denominator, it is sufficient to divide the numerators. Ex. $\frac{12}{17}$ divided by $\frac{3}{17}$ quotes 4.

§ 145. The quotient of any number divided by a proper fraction is greater than the dividend. It is obvious that any integer contains more halves, more third parts, and the like, than it contains units; and, if an integer and fraction be divided alike, the quotients will have the same proportion to the numbers divided; but the value of an integer is increased when the divisor is a proper fraction; therefore, the value of a fraction in the like case is increased also.

§ 146. The foregoing rule may be extended to every case, by reducing integers and mixed numbers to the form of improper fractions.

tions. We shall add some directions for shortening the operation when integers and mixed numbers are concerned.

1st. When the dividend is an integer, multiply it by the denominator of the divisor, and divide the product by the numerator.

Ex. Divide 368 by $\frac{5}{7}$

$$\begin{array}{r} 7 \\ \hline 5)2576(515\frac{1}{5} \text{ quotient.} \end{array}$$

2d. When the divisor is an integer, and the dividend a fraction; multiply the denominator by the divisor, and place the product under the numerator.

Ex. Divide $\frac{3}{8}$ by 5 quotient $\frac{3}{40}$
 $8 \times 5 = 40$

3d. When the divisor is an integer, and the dividend a mixed number, divide the integer, and annex the fraction to the remainder; then reduce the mixed number, thus formed, to an improper fraction, and multiply its denominator by the divisor.

Ex. To divide $576\frac{4}{7}$ by 7 quotient $82\frac{2}{7}$

$$\begin{array}{r} 7) 576 (82 \\ \underline{56} \end{array}$$

16

14

$$2\frac{4}{7} = \frac{26}{7}$$

$$11 \times 7 = 77$$

Here we divide 576 by 7, the quotient is 82, and the remainder 2, to which we annex the fraction $\frac{4}{7}$; and reduce $2\frac{4}{7}$ to an improper fraction $\frac{26}{7}$, and multiply its denominator by 7; which gives $\frac{26}{7}$.

1. Divide $\frac{3}{4}$ by $\frac{5}{7}$
2. $\frac{18}{10}$ by $\frac{1}{2}$
3. $\frac{32}{103}$ by $\frac{7}{9}$
4. $\frac{2}{3}$ by $1\frac{1}{7}$
5. $\frac{11}{17}$ by 5
6. 158 by $\frac{3}{4}$
7. 143 by $13\frac{3}{7}$
8. $542\frac{1}{2}$ by $4\frac{1}{7}$

9. Divide $\frac{2}{9}$ by $\frac{3}{11}$
10. $\frac{15}{10}$ by $\frac{1}{4}$
11. $\frac{342}{103}$ by $\frac{4}{7}$
12. $\frac{1}{7}$ by 14
13. $4\frac{3}{7}$ by 11
14. $164\frac{7}{11}$ by $\frac{2}{5}$
15. 3656 by $3\frac{2}{3}$
16. $36\frac{1}{2}$ by $12\frac{1}{3}$

§ 147. Hitherto we have considered the fractions as abstract numbers, and laid down the necessary rules accordingly. We now proceed to apply these to practice. Shillings and pence may be considered as fractions of pounds, and lower denominations of any kind as fractions of higher; and any operation where different denominations occur, may be wrought by expressing the lower ones in the form of vulgar fractions, and proceeding by the foregoing rules. For this purpose, the two following problems are necessary.

N

PROBLEM

PROBLEM V. *To reduce lower denominations to fractions of higher, place the given number for the numerator, and the value of the higher for the denominator.*

- Ex. 1.** Reduce 7d. to the fraction of a shilling. Answer $\frac{7}{12}$.
 2. Reduce 7d. to a fraction of a pound. Answer $\frac{7}{240}$.
 3. Reduce 15s. 7d. to a fraction of a pound. Answer $\frac{187}{240}$.
 4. Reduce $\frac{5}{9}$ of a penny to a fraction of a pound. Answer $\frac{5}{2160}$
 or $\frac{1}{432}$.
 5. Reduce $3\frac{1}{3}$ d. to a fraction of a pound. Answer $\frac{10}{720}$ or $\frac{1}{72}$.
 6. Reduce 2 qrs. 7 lb. to a fraction of 1 Cwt. Answer $\frac{61}{112}$
 or $\frac{9}{16}$.

Note 1. If the given quantity be in more denominations than one, we reduce it to the lowest; thus, 15s. 7d. in Ex. 3. is reduced to 187d.; and 2 qrs. 7 lb. in Ex. 6. to 63 lb.

Note 2. If a fraction be given, we multiply its denominator by the value of the higher denomination. Thus, in Ex. 4. we multiply the denominator 9 by 240, the value of a pound, and the product 2160 is the denominator of the fraction sought.

Note 3. If a mixed number be given, we reduce it to an improper fraction, and proceed as directed in the last note. Thus, in Ex. 5. we reduce $3\frac{1}{3}$ to $\frac{10}{3}$ of a penny, and then to $\frac{10}{720}$ of a pound.

1. Reduce 14s. 5d. to a fraction of a pound.
2. Reduce 9s. 4d. to a fraction of ditto.
3. Reduce 1s. $4\frac{1}{2}$ d. to a fraction of ditto.
4. Reduce 3 qrs. 7 lb. to a fraction of 1 Cwt.
5. Reduce $18\frac{1}{3}$ ells to a fraction of a Scots acre.
6. Reduce $\frac{1}{3}$ of a grain to a fraction of 1 lb. Troy.
- ¶ 7. Reduce 16s. $8\frac{1}{2}$ d. to a fraction of a pound.
8. Reduce 9d. $2\frac{1}{3}$ farthings to a fraction of a shilling.
9. Reduce 2 qrs. 13 lb. to a fraction of a ton.
10. Reduce $\frac{2}{7}$ of an inch to a fraction of a yard.
11. Reduce 7 dwt. 12 gr. to a fraction of 1 lb. Troy.
12. Reduce $\frac{2}{3}$ of a farthing to a fraction of a pound.

§ 148. **PROBLEM VI.** *To value fractions of higher denominations, multiply the numerator by the value of the given denomination, and divide the product by the denominator; if there be a remainder, multiply it by the value of the next denomination, and continue the division.*

Ex

Ex. 1. Required the value of

$\frac{17}{80}$ of L. 1.

$$\begin{array}{r} 17 \\ 20 \\ \hline 60 \overline{) 340} \quad \text{s. d.} \\ 300 \\ \hline 40 \\ 12 \\ \hline 60 \overline{) 480} \\ 480 \\ \hline 0 \end{array}$$

Ex. 2. Required the value of

$\frac{8}{9}$ of 1 Cwt.

$$\begin{array}{r} 8 \\ 4 \\ \hline 9 \overline{) 32} \quad \text{qrs. lb.} \\ 27 \\ \hline 5 \\ 28 \\ \hline 9 \overline{) 140} \\ 9 \\ \hline 50 \\ 45 \\ \hline 5 \end{array}$$

Sometimes the value of the fraction does not amount to an unit of the lowest denomination, but it may be reduced to a fraction of that or any other denomination, by multiplying the numerator according to the value of the places. Thus, $\frac{17}{80}$ of a pound is equal to $\frac{12}{160}$ of a shilling, or $\frac{4}{40}$ of a penny, or $\frac{9}{160}$ of a farthing.

1. $\frac{1}{7}$ of L. 1.
2. $\frac{1}{11}$ of 1 Cwt.
3. $\frac{1}{12}$ of a Scots acre
4. $\frac{5}{11}$ of 1 lb. Troy
5. $\frac{3}{20}$ of a mile
6. $\frac{4}{9}$ of a ton
7. $\frac{2}{7}$ of a yard
8. $\frac{1}{12}$ of a shilling

9. $\frac{1}{9}$ of L. 1.
10. $\frac{1}{11}$ of ditto.
11. $\frac{3}{10}$ of 1 Cwt.
12. $\frac{1}{11}$ of ditto.
13. $\frac{5}{8}$ of an English acre
14. $\frac{8}{11}$ of a Scots acre
15. $\frac{8}{11}$ of an ounce Troy
16. $\frac{1}{18}$ of a foot.

Questions for practice in Vulgar Fractions.

1. A has $\frac{1}{3}$ of a ship, B $\frac{1}{4}$, and C $\frac{1}{5}$ of the same, and the rest belongs to the master; how much is his share?
2. A minister's glebe being measured off, $2\frac{1}{2}$ acres were taken from A's ground, $3\frac{1}{8}$ from B's, $1\frac{9}{10}$ from C's, and $\frac{5}{11}$ from D's; how much does the glebe measure?
3. Required the weight of 6 pieces plate wg. $5\frac{1}{4}$ oz. $7\frac{9}{10}$ oz. $3\frac{5}{8}$ oz. $2\frac{1}{3}$ oz. $8\frac{3}{12}$ oz. and $3\frac{1}{10}$ oz.?
4. What is the difference between $\frac{1}{5}$ of an ounce and $\frac{1}{10}$ of 1 lb. averdupois?
5. What is the value of $\frac{1}{3}$ of 1 lb. at $\frac{7}{11}$ of L. 1 per lb.?

N 2

6. What

6. What is the value of $8\frac{5}{8}$ yards at $\frac{3}{4}$ of L. 1 per yard?
7. What is the value of an area $13\frac{1}{4}$ yards long, $12\frac{1}{2}$ broad, at $\frac{7}{18}$ of L. 1 per square yard?
8. What is price of a yard when $\frac{1}{2}\frac{1}{4}$ cost $\frac{3}{8}$ of L. 1?
9. Divide L. $135\frac{1}{8}$ among 10 men, so as 8 may have equal shares, and the other 2 only a third part of a share each?
10. Divide $15\frac{1}{2}$ acres into $12\frac{1}{4}$ parts?
11. If $\frac{3}{4}$ of a yard cost $\frac{7}{8}$ of L. 1, what will $2\frac{1}{2}$ yards cost?
12. If $17\frac{1}{2}$ lb. cost L. $2\frac{5}{8}$, what will $9\frac{1}{8}$ cost?

¶ 13. I pay away half my money, then a third of what remained, and then $\frac{1}{4}$ of what still remained. What proportion have I remaining?

14. What is the amount of $5\frac{1}{2}$ cwt. $2\frac{3}{4}$ cwt. $6\frac{1}{8}$ cwt. and $17\frac{1}{2}$ lb. averdupois?

15. A garden measures $\frac{3}{4}$ of an acre, the grass walks measure $\frac{1}{3}$ of a rood, the gravel walks $5\frac{1}{2}$ falls, and the flower borders occupy $\frac{1}{8}$ of the whole garden. How much remains for kitchen garden?

16. What is the value of $12\frac{5}{8}$ yards at $\frac{8}{18}$ of L. 1 per yard?

17. What is the value of 12 lb. 3 ounces silver at $\frac{3}{40}$ of L. 1 per oz.?

18. What is the solid contents of a box 3 feet 2 inches long, 2 feet 7 inches broad, and 11 inches deep?

19. What is the weight of $17\frac{1}{4}$ feet timber at $25\frac{1}{2}$ lb. averdupois per foot?

20. What is the price of a yard when $15\frac{3}{4}$ cost L. $2\frac{3}{8}$?

21. How many yards at $\frac{4}{9}$ of L. 1 may be bought for L. $4\frac{5}{9}$?

22. If $14\frac{1}{2}$ yards cost L. $2\frac{5}{8}$, what will $5\frac{3}{4}$ yards cost?

23. If $13\frac{1}{2}$ ounces cost L. $1\frac{1}{4}$, what will $18\frac{1}{2}$ lb. cost?

24. If $\frac{3}{4}$ of a yard 33 inches wide cost $\frac{1}{6}$ of L. 1, what will $27\frac{1}{2}$ yards 39 inches wide cost, the price of the yard being in proportion to the wideness?

CHAP. IX.

DECIMAL FRACTIONS.

SECT. I.

NOTATION AND REDUCTION.

§ 149. **T**HE arithmetic of vulgar fractions is tedious, and even intricate to beginners. The difficulty arises chiefly from the variety of denominators; for, when numbers are divided into

into different kinds of parts, they cannot be easily compared. This consideration gave rise to the invention of decimal fractions, where the units are divided into like parts, and the divisions and subdivisions are regulated by the same scale which is used in the Arithmetic of Integers. The first figure of a decimal fraction signifieth tenth parts, the next hundredth parts, the next thousandth parts, and so on; and the columns may be titled accordingly. Decimals are distinguished by a point, which separates them from integers, to which they are frequently annexed.

The use of cyphers in decimals, as well as in integers, is to bring the significant figures to their proper places, on which their value depends. As cyphers, when placed on the left hand of an integer, have no signification, but, when placed on the right hand, each cypher increases the value ten times each; so cyphers, when placed on the right hand of a decimal, have no signification, but, when placed on the left hand, each cypher diminishes the value ten times each.

The notation and numeration of decimals will be obvious from the following examples:

4.7	signifies	Four and seven tenth parts.
.47		Four tenth parts, and seven hundredth parts.
.047		Four hundredth parts, and seven thousandth parts.
.407		Four tenth parts, and seven thousandth parts.
4.07		Four, and seven hundred parts.
4.007		Four, and seven thousandth parts.

The figures next the decimal point are sometimes called decimal primes, the next decimal seconds; and so on.

§ 150. Because .4, or four tenth parts, is equal to forty hundredth parts, therefore .47 is equal to 47 hundredth parts; and, in general, decimals may be reduced to vulgar fractions, by placing the decimal figures for the numerator; and 1, with as many cyphers annexed as there are decimal places for the denominator. These may sometimes be brought to lower terms, as directed § 131.

Thus, $.875 = \frac{875}{1000} = \frac{175}{200} = \frac{35}{40} = \frac{7}{8}$.

§ 151. To reduce vulgar fractions to decimal ones; annex a cypher to the numerator, and divide it by the denominator, annexing a cypher continually to the remainder.

Ex.

<i>Ex. 1st.</i> $\frac{12}{75} = .16$	<i>Ex. 2d.</i> $\frac{5}{64} = .078125$	<i>Ex. 3d.</i> $\frac{2}{3} = .666$
75)120(16	64)500(078125	3)20(666
75	448	18
450	520	* 20
450	512	18
0	80	20
	64	18
	160	20
	128	
	320	
	320	
<i>Ex. 4.</i> $\frac{5}{60} = .0833$	<i>Ex. 5.</i> $\frac{7}{27} = .259$	<i>Ex. 6.</i> $\frac{7}{22} = .3, 18, 18,$
60)500(083	27)70(259	22)70(31818
48	54	66
* 20	160	* 40
18	135	22
20	250	180
18	243	176
20	* 70	* 40
		22
		180

If it be necessary to annex more cyphers than one to the numerator before we obtain a dividural, we prefix as many to the significant figures of the quotient. This is done in *Ex. 2d.* and *4th.*

§ 152. In like manner, when there is a remainder left in division, we may extend the quotient to a decimal, instead of completing it by a vulgar fraction, as in the following example :

$$25)646(25\frac{2}{5} \text{ or } 25.84$$

$$\begin{array}{r}
 50 \\
 \hline
 146 \\
 125 \\
 \hline
 \text{Rem. } 21.0 \\
 200 \\
 \hline
 100 \\
 100 \\
 \hline
 \bullet
 \end{array}$$

§ 153. From the foregoing examples, we may distinguish the several kinds of decimals. Some vulgar fractions may be reduced exactly to decimals, as Ex. 1st and 2d, and are called terminate or finite decimals. Others cannot be exactly reduced, because the division always leaves a remainder; but, when the division is continued to a sufficient number of places, it appears how the decimal may be extended to any length whatever. These are called interminate decimals. If the same figure continually returns, as in Ex. 3 and 4. they are called repeaters. If two or more figures return in their order, they are called circulates. If this regular succession go on from the beginning, they are called pure repeaters, or circulates, as Ex. 3d and 5th. If otherwise, as Ex. 4th and 6th, they are mixed repeaters or circulates, and the figures prefixed to those in regular succession are called the finite part. Repeating figures are generally distinguished by a dash, and circulates by a comma, or other mark, at the beginning and end of the circle; and the beginning of a repeater or circulate is pointed out in the division by an asterisk.

$\frac{3}{5}$	$\frac{4}{9}$	$\frac{5}{11}$	12(50.	$\frac{12}{21}$	$\frac{5}{11}$	$\frac{1}{31}$	28)854.
$\frac{19}{111}$	$\frac{7}{11}$	$\frac{3}{11}$	25(3726.	$\frac{13}{111}$	$\frac{4}{11}$	$\frac{7}{11}$	27)45.
$\frac{9}{11}$	$\frac{17}{11}$	$\frac{3}{11}$	9)4538.	$\frac{93}{111}$	$\frac{3}{11}$	$\frac{13}{11}$	99)500.
$\frac{11}{11}$	$\frac{9}{11}$	$\frac{15}{11}$	18)765.	$\frac{8}{9}$	$\frac{9}{11}$	$\frac{7}{11}$	11)365.

§ 154. When the quotient runs on to a great length, we may extend to many decimal places, and complete it by a vulgar fraction; or, the quotient may be easily found to a great number of places, by the method used in the following example.

Let it be required to reduce $\frac{1}{19}$ to a decimal. The five first places are .03448 and remainder .8, therefore the complete quotient is .03448 $\frac{8}{19}$; and since this is the value of $\frac{1}{19}$, the value of $\frac{8}{19}$ is found by multiplying it by the numerator 8=.27586 $\frac{6}{19}$, which being written for $\frac{8}{19}$ in the former expression, we have .0344825786 $\frac{6}{19}$ for the value of $\frac{1}{19}$. In like manner the value of $\frac{6}{19}$ is found by multiplying this last expression by 6=.2068965517 $\frac{7}{19}$, and the value of $\frac{1}{19}$ =.0344827562068965517 $\frac{7}{19}$. This operation may be repeated as often as we please, and each step will double the number of figures previously found. This method may be useful in other cases to facilitate division.

§ 155. To reduce lower denominations to decimals of higher; annex a cypher to the lower denomination, and divide it by the value of the higher. When there are several denominations, begin at the lowest, and reduce them in their order.

Ex. To reduce 5 cwt. 2 qr. 21 lb. to a decimal of a ton?

28)210(.75

4)2.75(.6875

20)5.6874(.284375

Here,

Here, in order to reduce 21 lb. to a decimal of 1 qr. we annex a cypher, and divide by 28, the value of 1 qr. This gives .75. Then we reduce 2.75 qrs. to a decimal of 1 cwt. by dividing by 4, the value of 1 cwt. and it comes to .6875. Lastly, 5.6875 cwt. is reduced to a decimal of a ton by dividing by 20, and it comes to .284375.

- | | | |
|-----|--------------------------|-----------------|
| 1. | Reduce 4s. 3d. to a dec. | of L. 1. |
| 2. | 8s. $11\frac{1}{4}$ d. | of do. |
| 3. | 9 oz. | of 1 lb. averd. |
| 4. | 7 cwt. 2 q. 7 lb. | of 1 ton. |
| 5. | 3 oz. 9 dwt. | of 1 lb. Troy. |
| 6. | 5 poles | of 1 acre. |
| 7. | 7s. 6d. to a dec. | of L. 1. |
| 8. | 8s. 4d. | of do. |
| 9. | 6 oz. 8 dwt. | of 1 lb. averd. |
| 10. | 6 oz. 3 dwt. | of 1 lb. Troy. |
| 11. | 7 lb. | of 1 cwt. |
| 12. | 42 minutes | of 1 hour. |

§ 156. *To value a decimal fraction: Multiply it by the value of the denomination, and cut off as many decimal places from the right-hand of the product as there are in the multiplicand. The rest are integers of the lower denomination.*

Ex. What is the value of .425 of L. 1.

$$\begin{array}{r}
 .425 \\
 20 \\
 \hline
 \text{sh. } 8.500 \\
 6 \\
 \hline
 \text{d. } 3.000
 \end{array}$$

- | | |
|---------------------------|-----------------------------|
| 1. .875 of L. 1. | 7. .365 of L. 1. |
| 2. .153125 of 1 lb. Troy. | 8. .003125 of ditto. |
| 3. .825 of 1 ounce do. | 9. .7486 of 1 ton. |
| 4. .375 of 1 chalden. | 10. .203125 of 1 lb. averd. |
| 5. .1125 of a ton. | 11. .0625 of 1 lb. Troy. |
| 6. .703125 of a mile. | 12. .4375 of 1 yard. |

S E C T. II.

ARITHMETIC OF TERMINATE DECIMALS.

§ 157. THE value of decimal places decreases like that of integers, ten of the lower place in either being equal to one of the next higher; and the same holds in passing from decimals to integers. Therefore, all the operations are performed in the same way with

deci-

decimals, whether placed by themselves, or annexed to integers, as with pure integers. The only peculiarity lies in the arrangement and pointing of the decimals.

§ 158. In ADDITION and SUBTRACTION arrange tenth parts under tenth parts, hundredth parts under hundredth parts, and proceed as in integers.

32.035	from 13.348	and 12.248
116.374	take 9.2993	10.6752
160.63		
12.3645	4.0487	1.5728
321.4035		

Required the sum of 3676.1 : 37.049 : 188.27 : 57642.00818 : 390 and 549.782.

The sum of 264.32 : 4835.9 : 288.49 : 002.0034 : 375.17 and 3.0482.

The difference of .3782 and .2997; of 37.84 and 26.93; of 25.38 and 19.982; of 4.273 and 1.9397; of 8.465 and .8465.

For further practice, the learner may reduce the following articles to decimals, and add or subtract them as above directed, and value the answers, which may be proven by the arithmetic of integers or vulgar fractions.

			Cwt. gr. lb.		Ch. B. F. P.	
L. 5	8	9	15 3 7	12 2 2 1	$\frac{12}{100}$	
0	7	3	12 1 0	13 1 2 3	$\frac{3}{100}$	
6	12	6	14 2 21	4 3 3 2	$\frac{12}{100}$	
4	12	4 $\frac{1}{2}$	3 3 14	7 0 0 2	$\frac{2}{100}$	
			A. R. P.	lb. oz. dw. gr.		
L. 4	13	7 $\frac{1}{2}$	15 3 20	4 6 9 9	$\frac{7}{100}$	
6	14	3	6 2 24	3 3 6 0	$\frac{10}{100}$	
12	3	6	9 1 17	4 9 15 18	$\frac{18}{100}$	
0	18	6 $\frac{1}{4}$	3 2 18	3 6 8 6	$\frac{4}{100}$	

§ 159. In MULTIPLICATION, allow as many decimal places in the product as there are in both factors. If the product has not so many places, supply them by prefixing cyphers on the left hand.

Ex. 1st, 1.37	Ex. 2d, 43.75	Ex. 3d, .1572
1.8	.48	.12
1096	35000	.618864
137	17500	
2.466	21.0000	

To multiply decimals by 10, move the decimal point one place to the

the right; to multiply by 100, 1000, or the like, move it as many places to the right as there are cyphers in the multiplier.

1. 34.17×3.02

2. $.304 \times .139$

3. $.748 \times .36$

4. $.003 \times 30.$

5. $7.46 \times .394$

6. $.875 \times .368$

7. $.625 \times 1.28$

8. $.012 \times 99.$

Quest. 1. What is the rent of 25 acres, 1 rood, 20 poles, at 8s. 9d. per acre?

2. What is the value of $756\frac{1}{4}$ yards, at 7s. 3d.?

3. What is the weight of $125\frac{1}{2}$ guineas, at 6 dwt. 9 gr.?

4. What is the value of $15\frac{7}{8}$ yards, at 18s. 6d.?

5. What is the value of 6 cwt. 3 qrs. at L. 2 : 16 : 6 per cwt.?

6. How many solid feet in a block marble, 3 feet 9 inches long, 2 feet 3 inches broad, and 1 foot 6 inches thick?

§ 160. In DIVISION, point the quotient so, that there may be an equal number of decimal places in the dividend as in the divisor and quotient together.

Therefore, if there be the same of decimal places in the divisor and dividend, there will be none in the quotient.

If there be more in the dividend, the quotient will have as many as the dividend has more than the divisor.

If there be more in the divisor, we must annex (or suppose annexed) as many cyphers to the dividend as may complete the number in the divisor, and all the figures of the quotient are integers.

If the division leave a remainder, the quotient may be extended to more decimal places; but these are not regarded in fixing the decimal point.

Ex. $.12)17.28(144$

$.12)1.728(14.4$

$.12).1728(1.44$

$.12)1728.$

$1728.00(14400.$

$1.2)17.28(14.4$

$12).1728(.0144$

1. $.85)13.6$

2. $.125)21625$

3. $384(8.9424$

4. $1.4(54.026$

5. $.19(61.56$

6. $1.349(16997.4$

7. $.56(173712$

The reason for fixing the decimal point, as directed, may be inferred from the rule followed in multiplication. The quotient multiplied by the divisor produces the dividend; and therefore the number of decimal places in the dividend is equal to those in the divisor and quotient together.

§ 161. The first figure of the quotient is always at the same distance from the decimal point, and on the same side, as the figure of the dividend, which stands above the unit place of the first product.

duct. This also takes place in integers; and the reason is the same in both.

- Quest.* 1. At what rate will $23\frac{1}{2}$ lb. amount to L. 4 : 2 : 3 ?
 2. Required to divide L. 140 : 11 : $6\frac{1}{2}$ into $7\frac{1}{2}$ shares ?
 3. Required to divide 15 acres 3 roods 8 falls into 16 equal parts ?
 4. At what rate will $17\frac{1}{4}$ yards amount to L. 11 : 8 : $6\frac{1}{2}$?
 5. If $8\frac{1}{4}$ yards cost L. 2 : 1 : $10\frac{1}{2}$, what will 1 yard cost ?

§ 162. It was formerly observed, that numbers were diminished when multiplied by proper fractions, and increased when divided by the same. Thus multiplication by fractions has the same effect as division by integers; and division by fractions as multiplication by integers; when we multiply by $\frac{1}{2}$ or .5, we obtain the same answer as when we divide by 2, and every integer has a correspondent decimal, which may be called its reciprocal. Multiplication by that decimal supplies the place of division by the integer, and division supplies the place of multiplication.

To find the reciprocal of any number, divide 1 with cyphers annexed by that number.

Ex. Required the reciprocal of 625.

$$\begin{array}{r} 625)1.000(.0016 \\ \underline{625} \\ 3750 \\ \underline{3750} \\ 0 \end{array}$$

The product of any number multiplied by .0016 is the same as the quotient of that number divided by 625; and the quotient of any number divided by .0016, is the same as the product of that number multiplied by 625. Example,

$$\begin{array}{r} 625)9375(15 \\ \underline{625} \\ 3125 \\ \underline{3125} \\ 0 \end{array}$$

$$\begin{array}{r} 9375 \\ .0016 \\ \hline 56250 \\ 9375 \\ \hline 15.0000 \end{array}$$

$$.0016)516(322500$$

$$516 \times 625 = 322500$$

S E C T. III

APPROXIMATE DECIMALS.

§ 163. It has been shown, that some decimals, though extended to any length, are never complete: And others, which terminate at last, sometimes consist of so many places, that it would be difficult in practice to extend them fully. In these cases we may extend the decimal to three, four, or more places, according to the nature of the articles, and the degree of accuracy required, and reject the rest as inconsiderable. In this manner we may perform any operation with ease by the common rules, and the answers we obtain are sufficiently exact for any purpose in business. Decimals thus restricted are called approximates.

§ 164. Shillings, pence, and farthings, may be easily reduced to decimals of three places, by the following rule: Take half the shillings for the first decimal place, and the number of farthings increased by 1, if it amount to 24, or upwards; by 2, if it amount to 48, or upwards; and by 3, if it amount to 72, or upwards, for the two next places.

Examples.			approx.	complete.
L.	s.	d.		L. s. d. s. d.
1.	12	13	$7\frac{1}{2}$ =L. 12.681 or L. 12.68125	2 7 3 11 4 $\frac{1}{2}$
2.	3	6	$10\frac{3}{4}$ 3.344	3.3447916 3 4 8 19 9 $\frac{1}{2}$
3.	5	12	3 5.612	5.61250 3 6 2 17 8 $\frac{1}{2}$
4.	3	19	3.95	3.95 1 5 5 16 3 $\frac{1}{2}$

In Ex. 1. we compute thus: The half of 13 is 6, which is the first decimal place, and a shilling over; which, together with $7\frac{1}{2}$ makes $19\frac{1}{2}$ d. or 78 farthings, to which we add 3 by the rule, because it exceeds 72, and obtain 81 for the two next decimal places.

Because 20 shillings make a pound, 2 shillings is the tenth part of a pound; and therefore half the number of shillings makes the first decimal place. If there were 50 farthings in a shilling, or 1000 in a pound, the units of the farthings in the remainder would be thousandth parts, and the tens would be hundredth parts, and so would give the two next decimal places; but, because there are only 48 farthings in a shilling, or 960 in a pound, every farthing is a little more than the thousandth part of a pound; and, since 24 farthings makes 25 thousandth parts, allowance is made for that excess, by adding 1 for every 24 farthings, as directed.

§ 165. If the number of farthings be 24, 48, or 72, and consequently the second and third decimal places 25, 50, and 75, they are exactly right; otherwise they are not quite complete, since there should be an allowance of $\frac{1}{4}$, not only for 24, 48, and 72 farthings,

but for every other single farthing. They may be completed by the following rule: Multiply the second and third decimal places, or their excess, above 25, 50, 75, by 4. If the product amount to 24, or upwards, add 1; if 48, add 2; if 72, add 3; by this operation are obtained two more decimal places; and, by continuing the same operation, the decimal may be extended till it terminate in 25, 50, 75, or in a repeater.

This rule may be illustrated, by comparing the complete decimals with the approximates in the foregoing examples. In performing it, we multiply the farthings, for which no allowance was formerly made, by 4, and divide the product by 100, which is effected by moving the figures two places to the right hand. Thus we obtain the value of $\frac{1}{100}$ of these farthings; and this, with the addition of 1 to 24, and continuation above directed, completes the proper allowance.

§ 166. Decimals of Sterling money of three places may easily be reduced to shillings, pence, and farthings, by the following rule: Double the first decimal place, and, if the second be 5, or upwards, add 1 thereto for shillings. Then divide the second and third decimal places, or their excess above 50 by 4, first deducting 1, if it amount to 25; or upwards; the quotient is pence, and the remainder farthings.

Ex. 1. .621 = 12s. 5 $\frac{1}{4}$	.374	.677	.483
2. .839 = 16 9 $\frac{1}{4}$	.369	.992	.528
3. .365 = 7 3 $\frac{1}{4}$	.435	.352	.593
4. .688 = 13 9 $\frac{1}{4}$	.492	.375	.373

In Ex. 1. we compute thus: Twice 6 is 12; and 21, divided by 4, quotes 5d. remainder 1 farthing. In Ex. 2. twice 8 is 16; and, because 39 exceeds 25, we deduct 1, and divide the remainder 28 by 4, which quotes 9d. remainder 2 farthings. In Ex. 3. because the second decimal place exceeds 5, we add 1 to twice 3, which gives 7 shillings, then we divide 15, the excess of the second and third places above 50, by 4, and obtain 3 $\frac{1}{4}$ d.

As this rule is the converse of the former one, the reason of the one may be inferred from that of the other. The value obtained by it, unless the decimal terminate in 25, 50, or 75, is a little more than the true value; for there should be a deduction not only of 1 for 25, but a like deduction of $\frac{1}{100}$ on the remaining figures of these places.

§ 167. We proceed to give some examples of the arithmetic of approximates, and subjoin any necessary observations.

Addi-

*Addition.**Cwt. qrs. lb.*

$$\begin{array}{r}
 3 \ 2 \ 14 = 3.625 \\
 2 \ 3 \ 22 = 2.94642 \\
 3 \ 3 \ 19 = 3.91964 \\
 4 \ 1 \ 25 = 4.47321 \\
 \hline
 \end{array}$$

$$14 \ 3 \ 24 \ 14.96427$$

*Subtraction.**Cwt. qrs. lb.*

$$\begin{array}{r}
 3 \ 2 \ 2 = 3.51785 \\
 1 \ 1 \ 19 = 1.41964 \\
 \hline
 2 \quad \quad 9 \quad 2.09821
 \end{array}$$

If we value the sum of the approximates, it will fall a little short of the sum of the articles, because the decimals are not complete.

Some add 1 to the last decimal place of the approximate, when the following figure would have been 5, or upwards. Thus the full decimal of 3 qrs. 22lb. is .94,6428571, and therefore, .94643 is nearer to it than .94642. Approximates thus regulated, will, in general, give exact answers, and sometimes above the true one, sometimes below it.

The mark + signifies that the approximate is less than the exact decimal, or requires something to be added. The mark — signifies that it is greater or requires something to be subtracted.

§168. *Multiplication.*

$$\begin{array}{r}
 8278 + \\
 2153 + \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 24834 \\
 41390 \\
 8278 \\
 16556 \\
 \hline
 \end{array}$$

$$1782|2534$$

$$\begin{array}{r}
 \text{Meth. 2d, } 8278 \\
 2153 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 16556| \\
 8278 \\
 41390 \\
 24834 \\
 \hline
 \end{array}$$

$$1782|2534$$

$$\begin{array}{r}
 \text{Meth. 3d, } 8278 \\
 3512 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 16556 \\
 827 \\
 413 \\
 24 \\
 \hline
 \end{array}$$

$$17820$$

Here the four last places are quite uncertain. The right-hand figure of each particular product is obtained by multiplying 8 into the figures of the multiplier; but if the multiplicand had been extended, the carriage from the right-hand place would have been taken in, consequently the right-hand place of each particular product, and the four places of the total product, which depend on these, are quite uncertain. Since part of the operation, therefore, is useless, we may omit it; and for this purpose it will be convenient to begin, as in § 29. at the highest place of the multiplier. We may perceive, that all the figures on the right-hand of the line in Method 2d, serve no purpose, and may be left out, if we only multiply the figures of the multiplicand, whose products are placed on the right-hand of the line. This is readily done by inverting the multiplier in Method 3d, and beginning each product with

with the multiplication of that figure which stands above the figure of the multiplier, and including the carriage from the right-hand place.

If both factors be approximates, there are as many uncertain places, at least in the product, as in the longest factor. If only one be an approximate, there are as many uncertain places as there are figures in that factor, and sometimes a place or two more, which might be affected by the carriage. Hence we may infer, how far it is necessary to extend the approximates, in order to obtain the requisite number of certain places in the product.

This method may be used, though the decimals be fully extended, and no more places be required in the product than in the factors.

§ 169. *Division.*

$$\begin{array}{r} .3724 -) 79864327 + (2144 \\ \underline{7448} \end{array}$$

$$\begin{array}{r} 5384 \\ \underline{3724} \end{array}$$

$$\begin{array}{r} 16602 \\ \underline{14896} \end{array}$$

$$\begin{array}{r} 17063 \\ \underline{14892} \end{array}$$

$$2171$$

$$\text{or thus } 3724) 79864327 (2144 \\ \underline{7448}$$

$$538$$

$$372$$

$$166$$

$$148$$

$$18$$

$$14$$

$$4$$

Here all the figures on the right-hand of the line are uncertain; for the right-hand figure of the first product 7448 might be altered by the carriage, if the divisor were extended; and all the remainders and dividuums that follow are thereby rendered uncertain. We may omit these useless figures; for which purpose we dash a figure on the right-hand of the divisor at each step, and neglect it when we multiply by the figure of the quotient next obtained; but we include the carriage. The operation, and the reason of it, will appear clear, by comparing the operation at large, and contracted, in the above example.

S E C T. IV.

INTERMINATE DECIMALS.

§ 170. THE value of interminate decimals may be illustrated by collecting the values of the different places. For example, let the value of $11x$ be required: The first decimal place signifies $\frac{1}{10}$, the second $\frac{1}{100}$, the third $\frac{1}{1000}$. The sum of the two first is $\frac{11}{100}$, of the three

three first $\frac{1}{1000}$; and so on. If we subtract their values from $\frac{1}{9}$, the first remainder is $\frac{1}{90}$, the second $\frac{1}{900}$, and the third $\frac{1}{9000}$. Thus as the values of the successive figures are included, the amount approaches nearer and nearer to $\frac{1}{9}$, and by extending its decimal, the difference becomes less than the smallest fraction that can be assigned, and may be entirely disregarded. This will be further illustrated when we treat of Geometrical Progression.

Repeating figures, therefore, signify ninth parts; and by the same manner of reasoning it may be shown, that circulates of two places signify ninety-ninth parts, those of three places nine hundred and ninety-ninth parts; and so on. Hence we may infer the following

§ 171. RULES for reducing interminate decimals to vulgar fractions.

I. If the decimal be a pure repeater, place the repeating figure for the numerator, and 9 for the denominator.

II. If the decimal be a pure circulate; place the circulating figures for the numerator, and as many 9's as there are places in the circle for the denominator.

III. If there be cyphers prefixed to the repeating or circulating figures, annex a like number to the 9's in the denominator.

IV. If the decimal be mixed, subtract the finite part from the whole decimal. The remainder is the numerator; and the denominator consists of as many 9's as there are places in the circle, together with as many cyphers as there are finite places before the circle.

Thus, $235,62 = \frac{23562}{9999}$

From the whole decimal

23562

we subtract the finite part

235

and the remainder

23327 is the numerator.

The reason may be illustrated by dividing the decimal into two parts, whereof one is finite, and the other a pure repeater or circulate, with cyphers prefixed. The sum of the vulgar fractions corresponding to these, will be the value of the decimal sought.

.235,62, may be divided into .235 = $\frac{235}{1000}$ by Rule I.

and .000,62 = $\frac{62}{9999}$ by Rules II. III.

In order to add these vulgar fractions, we reduce them to a common denominator; and for that purpose, we multiply both terms of the former by 99, which gives $\frac{23562}{9999}$; then we add the numerators.

235	or by method explained § 27.			Sum of numerators.
99				
2115	23500	23265	or	23562
2115	235	62		235
23265	23265	23327		23327

Examples for Practice.

.34,	.145	.3452	.078,	.14634
.916	.145,	.3,452,	.0,78,	.14634,
.36	.1,45,	.34,52,	.078	.146,34,
.244,	.0145,	.3452,	.07,80,	.14,634,

§ 172. All circulating decimals may be reduced to a similar form, having a like number both of finite and circulating places. For this purpose we extend the finite part of each as far as the longest, and then extend all the circles to so many places as may be a multiple of the number of places in each.

Ex. .34,725, extended .34,725725725725,
 1,4562, 14,562456245624,

Here the finite part of both is extended to two places, and the circle to 12 places, which is the least multiple for circles of 3 and 4 places.

§ 173. To add repeating decimals, extend the repeating figures one place beyond the longest finite ones; and, when you add the right-hand column, carry to the next by 9.

Ex. .37524	or	37524	.28	.296	$\frac{7}{10}$
.8		88888	.328	.42	$\frac{42}{100}$
.643		643	.4697	.7548	$\frac{7548}{10000}$
.78		73333	.36	.31	$\frac{31}{100}$
		264048			

§ 174. To subtract repeating decimals, extend them, as directed for addition, and borrow at the right-hand place, if necessary, by 9.

.93568	.646	.7358	.7382	.469
.84738	.53427	.62563	.68	.35
.08827	.11172			

The reason of these rules will be obvious, if we recollect that repeating figures signify ninth parts. If the right-hand figure of the sum or remainder be 0, the decimal obtained is finite; Otherwise it is a repeater.

Ex. $.13494$
 $.367$

$9446x$
 809666
 4048333

$.0495246x$

1. $.548 \times .65$
2. $.713 \times .452$
3. $.316 \times .6824$
4. $.1423 \times .318$
5. $.697 \times .39$
6. $.895 \times .2368$

If the sum of the right-hand column be an even number of 9's, the product is finite; otherwise, it is a repeater.

§ 178. CASE II. When the multiplier is finite, and the multiplicand circulates, add to each product of the right-hand figure the carriage which would have been brought to it if the circle had been extended. Each line of the product is a circle similar to the multiplicand, and therefore they must be extended and added accordingly.

Ex. $.37,46, \times .235$

$.235$

$187,32,$
 $1123,93,$
 $7492,92,$

$.08804,19,$

1. $.674, \times .78$
2. $.37, \times .86$
3. $.625, \times .42$
4. $.4793, \times 4.8$
5. $.3,75, \times 1.24$
6. $.2,963, \times .36$

§ 179. CASE III. When the multiplier repeats or circulates, find the product as in finite multipliers, and place under it the products which would have arisen from the repeating or circulating figures, if extended.

Ex. 1st. $.958 \times .8$

8
 $7664|$
 7664
 7664
 7664
 7664

$.8518$

Ex. 2d. $.784 \times .36,$

36
 4704
 2352
 $28224|$
 28224
 28224

$.284,09,$

§ 180. To multiply by 3 take one-third of the multiplier; and to multiply by 6 we take two thirds.

784×3

8761×6

It is evident, that, if a repeating multiplier be extended to any length, the product arising from each figure will be the same as the first, and each will stand one place to the right-hand of the former.

In like manner, if a circulating multiplier be extended, the product arising from each circle will be the same, and will stand as many places to the right-hand of the former as there are figures in the circle. In the foregoing examples, there are as many of these products repeated as is necessary for finding the total product. If we place down more, or extend them further, it will only give a continuation of the repeaters or circulates.

§ 181. When both factors are interminate, the multiplication may be performed by combining the two last rules; but it is easier to reduce the multiplier to a vulgar fraction, and multiply as directed § 143. This method may also be used when the multiplicand is terminate; and, as the divisor consists of 9's, the contraction explained § 62. may be used, which will lead to the same operation as was explained § 179. upon decimal principles.

$$\text{Ex. 3d. } .735 \times .3,26 = \frac{323}{999}$$

$$\begin{array}{r} 323 \quad 3 \\ \hline 2205 \quad 323 \\ 1470 \\ \hline 2205 \end{array}$$

$$\begin{array}{r} 99 \overline{) 237405} \\ 2374,05 \\ 23,74 \\ \hline ,23 \end{array}$$

$$.2398,03,$$

$$\text{Ex. 5. } .63 \times .2,39 = \frac{337}{999} \quad \text{Ex. 6. } 12, \times .03 = \frac{3}{99}$$

$$\begin{array}{r} .237 \quad 2 \\ \hline 443 \quad 237 \\ 1896 \\ \hline 12666 \end{array}$$

$$99 \overline{) 15010} (.15,16,$$

$$\begin{array}{r} 99 \\ \hline 511 \\ 495 \\ \hline * 160 \\ 99 \\ \hline 610 \\ 594 \\ \hline * 16 \end{array}$$

$$\text{Ex. 4th. } .278 \times .365 = \frac{365}{999}$$

$$\begin{array}{r} 365 \\ \hline 1390 \\ 1668 \\ \hline 834 \end{array}$$

$$\begin{array}{r} 999 \overline{) 101470,} \\ 101, \\ \hline .101,571, \end{array}$$

$$\begin{array}{r} 3 \\ \hline 99 \overline{) 36,36} (.036730945821854912764, \\ 666 \\ 723 \\ 306 \\ 936 \\ 453 \\ 576 \\ 813 \\ 216 \\ 183 \\ 846 \\ 543 \\ 486 \\ 903 \\ 126 \\ 273 \\ 756 \\ 633 \\ 396 \\ * 036 \end{array}$$

In

In Ex. 5. the multiplicand is a repeater, and the multiplication by the numerator is performed as directed § 177. In Ex. 6. the multiplicand is a circulate, and the multiplication is performed as directed § 178. In these cases the repeating and circulating figures must be annexed to the remainders in the division, and the contraction § 62. cannot be used. In Ex. 6. the products by the divisor are omitted, and the remainders only marked. These are found by adding the left-hand figure of each dividual to the remaining figures of the same. Thus, 363 is the first dividual; and 3 the left-hand figure, added to 63 the remaining figures, gives 66, the first remainder. The quotient is the same as the first place of the dividual, unless the remainder, as found by the foregoing direction, equals or exceeds the divisor. This happens in the last step, and then the quotient is one more than the first figure of the dividual, and the true remainder is the excess of the computed one above the divisor.

The number of places in the product is often great, but it cannot exceed the product of the denominator of the multiplier into the number of places in the circle of the multiplicand.

§ 182. The multiplication of interminate decimals may be proven by changing the factors, § 31. or by reducing them both to vulgar fractions in their lowest terms, multiplying these as directed § 141. and reducing the product to a decimal.

1. .843 × .3	6. .346 × .23	11. .285714, × .418,
2. .8761 × .6	7. .376 × .75	12. .1,571428, × .63
3. .58 × .73	8. .683 × .25,	13. .18, × .18,
4. .26 × .385	9. .381 × .53	14. .21, × .428571,
5. .573 × .37,	10. .648 × .648	15. .01, × .01.

Quest. 1. What is the expence of making 5 furlongs 3 poles of road, at L. 166 : 13 : 4 per mile?

2. What is the value of 5 lb. 23. 19. 16grs. rhubarb, at L. 1, 10s. per lb.?

3. What is the rent of 5 acres, 3 roods, 4 poles, at L. 3 : 10 : 10 per acre?

4. What is the price of 3 cwt. 2 qrs. 7 lb. at L. 5 : 6 : 8?

5. What is the price of $13 \frac{5}{8}$ yards, at 11s. 4d. per yard?

6. What is the value of 6 dwt. 8 gr. silver, at 5s. 8d. per oz.?

7. What is the price of 7 lb. 4 oz. quicksilver, Troy weight, at 5s. 8d. per lb.?

8. What is the price of 14 gallons at L. 1 : 17 : 12, per hd. of 54 gallons?

TO DIVIDE INTERMINATE DECIMALS.

§ 183. CASE I. When the dividend only is interminate, proceed as in common arithmetic; but, when the figures of the dividend are exhausted, annex the repeating figure, or the circulating figures in their order, instead of cyphers to the remainder.

Ex.

Ex. 1. Divide .5326 by 7.

7) .5326 (.76,095238,

$$\begin{array}{r}
 49 \\
 \hline
 42 \\
 42 \\
 \hline
 * 066 \\
 63 \\
 \hline
 36 \\
 35 \\
 \hline
 16 \\
 14 \\
 \hline
 26 \\
 21 \\
 \hline
 56 \\
 56 \\
 \hline
 * 066
 \end{array}$$

Ex. 2. Divide .496, by 3.

3) .496, (.165498832,

$$\begin{array}{r}
 3 \\
 \hline
 19 \\
 18 \\
 \hline
 16 \\
 15 \\
 \hline
 14 \\
 12 \\
 \hline
 29 \\
 27 \\
 \hline
 26 \\
 24 \\
 \hline
 24 \\
 24 \\
 \hline
 09 \\
 9 \\
 \hline
 06 \\
 6 \\
 \hline
 * 04
 \end{array}$$

In this operation the quotient is never finite. It may repeat if the dividend repeats; or, if the dividend circulate, it may circulate an equal number of places, often more, and never fewer. The greatest possible extent of the circle is found, by multiplying the divisor into the number of places in the circle of the dividend. Thus, in Ex. 2. a circulate of 3 places, divided by 3, quotes a circulate of 3 times 3, or 9 places.

§ 184. CASE II. *When the divisor is interminate, the multiplications and subtractions must be performed according to the directions given for repeating and circulating decimals.*

Ex.

Ex. 1. Divide .245892 by 2,18,
 .2,18,).245892(1.127005
 218181,81,

27710,18,
 21818,18,

5892,00,
 4363,63,

1528,36,
 1527,27,

1090,90
 1090,90

0

Ex. 2. Divide .42, by .185,
 185185,).424242,(2.2,90,
 370370,

0,538720,
 370370,

* 1,683501,
 1,666666,

* .0,168350

In these examples, the dividends and products are extended as far as necessary; and, in Ex. 2. the divisor and dividend are extended till their circles become similar.

§ 185. The foregoing method is the only one which properly depends on the principles of decimal arithmetic, but it is generally shorter to proceed by the following rule.

Reduce the divisor to a vulgar fraction, multiply the dividend by the denominator, and divide the product by the numerator.

Ex. 1. Divide .245892 by 2,18. = $\frac{245892}{218}$
 2,18, 245892 $\times$ 990.

2 245892

216)243.43308(1.127005
 216

274
 216

583
 432

1513
 1512

1080
 1080

Ex. 2. Divide .42, by .185, = $\frac{42}{185}$

424,24
 42

185)423,81(.2,2,90,
 370

538
 370

* 1681
 1665

* 1681

Ex. 3. Divide 543750 by $7\frac{2}{3}$

$$\begin{array}{r} 543750 \\ 54375 \\ \hline \end{array}$$

Ex. 4. Divide 17,45, by $.84\frac{2}{3}$

$$\begin{array}{r} .1745,45, \\ 17,45, \\ \hline \end{array}$$

$$7)489375(.69910,714285, 84)1728,00(.20,571428,$$

Ex. 5. Divide 267,063, by $.436\frac{2}{3}$

$$\begin{array}{r} 4,36, .26706,306 \\ 4 \quad 267,063 \\ \hline \end{array}$$

$$432 \quad)264.39,243, (.6120,195,$$

Note 1. As the denominator consists of one or more 9's, the multiplication is performed more easily by the contraction § 27.

Note 2. Division by 3 triples the dividend, and division by 6 increases the dividend one half.

Note 3. If a repeating dividend be divided by a repeating or circulating divisor; or, if a circulating dividend be divided by a similar circulating divisor; or, if the number of places in the circle of the divisor be a multiple of the number in the dividend; then the product of the dividend multiplied by the denominator of the divisor will be terminate, since like figures are subtracted from like in the contracted multiplication, and consequently no remainder left. See Ex. 4. In other cases the original and multiplied dividend are similar. The form of the quotient depends on the divisor, as explained afterwards.

Note 4. If the terms be similar, or extended till they become so, the quotient is the same as if they were finite, and the operation may be conducted accordingly; for the quotient of vulgar fractions that have the same denominator, is equal to the quotient of their numerators.

1. $5).843$

2. $.12).224$

3. $.15).95$

4. $.3).13,$

5. $.32).768,$

6. $.325).250,714285,$

7. $.6).375$

8. $.12).88$

9. $.7).378$

10. $.6).37845$

11. $.3).976,$

12. $.5).17,$

13. $.27).481$

14. $.5,17).7632$

15. $.19,39).12693$

16. $.18).2,047$

17. $.16).25,89,$

18. $.16).284,$

Quest. 1. How many yards at 6s. 8d. may be purchased for L. 28 : 10s.?

2. If $12\frac{1}{2}$ yards cost L. 4 : 9 : 5, how much will 1 yard cost?

3. Divide 4 lb. 5 oz. silver into $5\frac{1}{2}$ shares.

4. Divide 3 cwt. 3 qrs. $15\frac{1}{2}$ lb. into $2\frac{1}{2}$ shares.

5. How many lb. at 2s. 5d. may be purchased for L. 3 : 15 : $6\frac{1}{4}$?

6. If $18\frac{1}{2}$ yards cost L. 2 : 12 : 11, what will 1 yard cost?

7. Divide L. 5 : 17s. into $9\frac{1}{2}$ shares.

8. If 6 cwt. 2 qrs. 9 lb. cost L. 5 : 5 : $5\frac{3}{4}$, what will 1 cwt. cost?

§ 186. We shall conclude this chapter, by considering what vulgar fractions produce the several kinds of decimals, terminate or interminate, repeating or circulating, pure or mixed.

First, Vulgar fractions whose denominator is 2, 5, or any of their powers*, produce terminate decimals; and the number of places is pointed out by the exponent of the power. If the numerator be 1, the decimal or reciprocal of any power of 2 or 5 is the same power of 5 or 2 respectively; for any power of 2 multiplied by the same power of 5, produces a like power of 10: Thus, $4 \times 25 = 2^2 \times 5^2 = 2 \times 5 \times 2 \times 5 = 10 \times 10 = 100$ or 10^2 , consequently $\frac{100}{4} = 25 \frac{1.00}{4} = .25$ and $\frac{1.00}{25} = .04$. It is easy to show that unity, with any number of cyphers annexed, cannot be measured by numbers that are not powers of 2 or 5; and therefore no other denominators produce terminate decimals.

Secondly, The denominators 3 and 9 produce pure repeaters; and, when the denominator is 9, the repeating figure is the numerator. This may be inferred from the doctrine of casting out the 9's, § 75.

Thirdly, If the denominator be a power of 2 or 5, multiplied by 3 or 9, the decimal is a mixed repeater; and the number of finite places is pointed out by the exponent of the power. To illustrate this, we may divide by the component parts of the denominator; the first division, by a power of 2 or 5, quotes a finite decimal; and the second, by 3 or 9, quotes a repeater, when the figures of the dividend or first quotient are exhausted. When the numerator is unity, the first quotient is a power of 5 or 2; and, if the second divisor be 3, the remainder of the second division is the same as the result of that power when the 3's are cast. Now, if we cast the 3's out of 2×2 , the result is 1; out of $2 \times 2 \times 2$, the result is 2; out of $2 \times 2 \times 2 \times 2$, the result is 1; and in general the result of the even powers is 1, and of the odd powers 2. This also applies to the powers of 5, the result of which is 2. When the division is continued, if the exponent of the power be even, the repeating figure is 3, if odd 6. If the second divisor be 9, the repeating figure is the same as the result of the first quotient when the 9's are cast out.

Fourthly, Denominators that are multiples of 2 or 5, and their powers by other numbers than 3 and 9, produce mixed circulates: For, if the division be performed by the component parts of the denominator, the first divisor being a power of 2 or 5, quotes a finite decimal; and the second quotes a circulate when the figures of the first quotient are exhausted.

Fifthly, All denominators of which 2, 5, or their powers are not component parts, except 3 and 9, quote pure circulates. The number of places in the circle cannot exceed the denominator diminished

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ed

* The nature and notation of powers is explained Part II. Chap. I.

ed by unity, but is often much less. If the denominator be a power of 3, the number of places is found by dividing it by 9.

The form of all decimals depends upon the denominator of the vulgar fraction from which they are derived; and therefore remains the same, whatever the numerator be, providing the fraction be in its lowest terms. If cyphers be annexed to the significant figures in the denominator, an equal number of additional cyphers are prefixed to the decimal.

We recommend it to the student to reduce all the vulgar fractions whose numerators are units, and denominators to 30 or upwards, to decimals; dividing by the component parts when it can be done, and applying the foregoing observations.

PART

AN

INTRODUCTION

to

MERCHANDISE.

PART II. ALGEBRA.

CHAP. I.

NOTATION.

§ 1. **A**LGEBRA is a general method of computation, in which numbers are represented by letters, and their proportions and relations pointed out by characters or symbols. It applies to magnitudes of every kind, and affords the greatest assistance in every branch of mathematical knowledge. It illustrates the doctrines of geometry, and generally leads to the solution of geometrical problems with more certainty and expedition. It explains the foundation, and unfolds the rules of the more difficult parts of arithmetic.

§ 2. Known quantities are either marked down in figures, or represented by the first letters of the alphabet, *a, b, c*, &c. Unknown quantities are represented by the last letters of the alphabet, *x, y, z*.

- | | | |
|---|---------|--|
| + | (Plus) | Is the sign of addition. |
| - | (Minus) | Is the sign of subtraction. |
| x | | Is the sign of multiplication. |
| ÷ | | Is the sign of division. |
| = | | Is the sign of equality. |
| ⌊ | | Is the sign of inequality, the lesser quantity being placed at the open part of the character. |

To illustrate the use of these characters, let us suppose *a* equal to 12, *b*=3, *c*=2, and *d*=4.

Q 2

Then,

$$\text{Then, } a + b = 15$$

$$a - b = 9$$

$$a \times b = 36$$

$$a \div b = 4$$

$$a + b + c = 17$$

$$a - b - c = 7$$

$$a \times b \times c = 72$$

$$a \div b$$

§ 3. The signs of addition and subtraction, +, —, are sometimes prefixed to single quantities, and denote the sense in which they are to be understood, being always opposed to each other. Thus, if one of them signify gain, the other signifies loss: If one of them signify height, the other signifies depth: If one of them signify motion produced, the other signifies motion destroyed.

§ 4. A VINCULUM is a line drawn over letters, and points out how many are to be multiplied or divided. Thus,

$$\overline{a + b} \times c + d = 22$$

$$\overline{a + b} \times c + d = 34$$

$$\overline{a + b} \times \overline{c + d} = 30$$

$$\overline{a + b} \times \overline{c + d} = 90$$

$$\overline{b + a} \div c + d = 11\frac{1}{2}$$

$$\overline{b + a} \div c + d = 13$$

$$\overline{b + a} \div \overline{c + d} = 2\frac{1}{2}$$

$$\overline{b + a} \div \overline{c + d} = 5$$

The vinculum is also used along with other symbols, and signifies in general that the quantities under it are to be connected, and applied as one quantity.

Sometimes a dot . is used in place of $\times$. Thus, $\overline{a + b} . \overline{c + d} = 90$.

§ 5. Division is commonly represented in the form of a fraction, by placing the dividend above a line, and the divisor under it. Thus,

$$\frac{a}{b} = 4, \frac{a}{c} = 6, \frac{a}{d} = 3, \frac{d}{c} = 2, \frac{a + d}{c} = 8.$$

§ 6. A number prefixed to a letter is called its coefficient, and is understood to multiply the value of the letter. Thus, $5a = 60$, $7b = 21$.

When letters are placed together, the quantities they represent are understood to be multiplied into each other. Thus, $ab = 36$, $ac = 24$, $bc = 6$, $abc = 72$.

If the same letter be repeated twice, or oftener, its value is understood to be multiplied into itself as often. Thus $aa = 144$, $aaa = 1728$, $bbb = 27$, $bbbb = 81$, $cccc = 32$, $aacc = 1152$.

§ 7. Instead of repeating the same letter, it is common to mark a small character above it towards the right hand, which points out that it is to be understood as repeated as often.

$$\text{Thus, } a^2 = aa \text{ or } 144$$

$$a^3 = aaa \text{ or } 1728$$

$$b^4 = bbbb \text{ or } 81$$

$$a^2 c^3 = aacc \text{ or } 1152.$$

Quantities produced by the successive multiplication of another, are called powers of that quantity. Thus, a^2 (144) is the square or second power of a (12); a^3 (1728) is the cube or third power of the same; a^4 (20736) is the fourth power or biquadratic; a^5 (248832)

is the fifth power or fursolid; and so on. The simple quantity a (12) is called the root or first power; and the small figure which points out the order of the power, is called the index or exponent.

§ 8. Quantities which produce a given quantity by successive multiplication, are called roots of the quantity produced.

Thus, 2 is the square root of 4, for $2 \times 2 = 4$

3 is the cube root of 27, for $3 \times 3 \times 3 = 27$

5 is the biquadratic root of 625, for $5 \times 5 \times 5 \times 5 = 625$

$\sqrt{\quad}$, or $^2\sqrt{\quad}$, denotes the square root of the quantity to which it is applied. Thus, $\sqrt{9} = 3$, $\sqrt{ab} = 6$.

$^3\sqrt{\quad}$ denotes the cube root. Thus, $^3\sqrt{125} = 5$, $^3\sqrt{ac+b} = 3$.

A higher exponent placed above the radical sign $\sqrt{\quad}$ denotes the like root of the quantity under it. Quantities under the radical sign are called furs.

§ 9. We shall now give some mixed examples of algebraic notation. For which purpose, let $a=12$, $b=3$, $c=2$, $d=4$, $e=5$, $f=9$, $g=25$, $h=7$, $i=11$, $k=1$.

$$1^{\text{st}}, \frac{ac}{d} + \frac{g-f}{c} - ^3\sqrt{cd} = \frac{12 \times 2}{4} + \frac{25-9}{2} - ^3\sqrt{2 \times 4} = 12.$$

Here ac , or $12 \times 2 = 24$, which divided by 4 quotes 6, the value of the first term. Then f , or 9, being subtracted from g , or 25, the remainder is 16; which, divided by c , or 2, quotes 8, the value of the second term. Therefore the sum of the first and second terms is 14. Then cd , or 2×4 , is 8, the cube root of which, 2, is the value of the third term; and this, subtracted from the amount of the former terms, because connected by the sign $-$, gives the whole value of the expression 12.

$$2^{\text{d}}, \sqrt{\frac{ae+d}{i-b}} = 4$$

Here, because the divisor and dividend are both under the radical sign, we collect the values of each, and, after dividing them, extract the square root of the quotient. The dividend amounts to 64, the divisor to 4; the quotient therefore is 16, and its square root 4.

$$3^{\text{d}}, \frac{\sqrt{ae+d}}{i-b} = 2$$

Here the dividend only is under the radical sign. Its square root is 8, and when divided by 4, the quotient 2.

$$4^{\text{th}}, b^3 d^3 - d\sqrt{f} + \sqrt{df} - e \times ^3\sqrt{g+b^2} - ce + \frac{^3\sqrt{eg}}{\sqrt{ci+b}} = 407$$

Here, b^3 , or the cube of 3, is 27, and d^3 , or the square 4, is 16, which,

which, multiplied together, produce 432, the value of the first term. Then the square root of f , or 9, is 3, which, multiplied by d or 4, produces 12, the value of the second term. Then the product of d or 4, multiplied by f , or 9, is 36, whose square root 6, is the value of the third term. Then g , or 25, added to 49, the square of b , or 7, is 74; from which, subtracting ce , or 2 multiplied into 5, or 10, the remainder is 64; the cube root of which, 4, being multiplied by e , or 5, gives 20 for the value of the fourth. Then eg , or 25, multiplied by 5, is 125, whose cube root is 5, the value of the dividend in the last term; and ci , or 2, multiplied by 11, is 22, to which add b , or 3, the sum is 25, and its square root, 5, is the divisor of the last term; and, because the dividend was also 5, the value of the last term is 1. The several terms being added or subtracted, as the signs direct, the value of the whole expression is 407.

$$1\text{st}, 3a-5b+8g-gb$$

$$2\text{d}, ab-cd+ef+gh-ik$$

$$3\text{d}, a^2-b^3+c^4-d^2+e^5$$

$$4\text{th}, a^2bc+ab^2c-abc^2+a^3b^2-a^2c^3$$

$$5\text{th}, \overline{a+b} \times \overline{g-h} \times \overline{i-k}$$

$$6\text{th}, \overline{a+b} \times \overline{g-h} \times \overline{i-k}$$

$$7\text{th}, a^2b - \frac{a^2}{b} + \frac{a}{c^2}$$

$$8\text{th}, \frac{a}{b} \times \frac{d}{c} \times \frac{g}{f}$$

$$9\text{th}, \frac{a}{b} + \frac{d}{c} + \frac{g}{f}$$

$$10\text{th}, \frac{a+d+g}{b+c+f}$$

$$11\text{th}, \sqrt{df} + d\sqrt{f} + f\sqrt{d}$$

$$12\text{th}, \sqrt[3]{f-k} + \sqrt{ai-bb-c}$$

$$13\text{th}, g^2-g+\sqrt{g}-\sqrt[3]{g+c}$$

$$14\text{th}, b^2c^3d^4-\sqrt{dg}+d$$

$$15\text{th}, \frac{\sqrt{def+ef}}{bcd+k} + \sqrt{\frac{def+ef+g}{f+k}}$$

$$16\text{th}, \sqrt{\frac{a^2}{\sqrt{f}} + \frac{\sqrt{hi+d}}{\sqrt[3]{g+c}}} + \frac{d^4}{f-k-\sqrt[3]{b+e}} + d^3 + b$$

C H A P. II.

P R I M A R Y R U L E S .

S E C T I O N I .

A D D I T I O N .

§ 10. RULE I. **I**F the quantities be like, and their signs the same, add the coefficients, prefix the sign, and annex the common letter or letters.

RULE II. If the quantities be like, but the signs different, subtract the lesser coefficient from the greater; to their difference prefix the sign of the greater, and annex the common letter or letters.

RULE III. If the quantities be unlike, write them one after another, with their proper signs and coefficients.

I. Ex. 1st.	2d.	3d.	4th.
To $+ 5a$	$- 9ab$	$+ 5a^2$	$3a - 7b$
Add $+ 7a$	$- 6ab$	$+ 9a^2$	$a - 3b$
$+ 12a$	$- 15ab$	$+ 14a^2$	
II. Ex. 1st.	2d.	3d.	4th.
To $+ 5a$	$- 9b$	$- 12ab$	$+ 7a^2 + 4a$
Add $- 3a$	$+ 6b$	$+ 14ab$	$- 3a^2 - 13a$
$+ 2a$	$- 3b$	$+ 2ab$	
III. Ex. 1st.	2d.	3d.	4th.
$+ 7a$	$+ 7a$	$a - b$	$aa - a$
$+ 3b$	$- 3b$	$b - c$	$3b - 2c$
$7a + 3b$	$+ 7a - 3b$	$a - c$	
Mixed Ex. 1st.	2d.	3d.	4th.
$+ 7a - 5b$	$a - b + c$	$aa - 10a$	$7ab - 5ac$
$+ 9a + 7b$	$5a + 3b - 7c$	$7a - \sqrt{a}$	$- 9ab + 14ad$

The arrangement of the articles must be altered when necessary, that like quantities may stand under like.

If there be more than two quantities of the same kind, we add the positive into one sum and the negative into another, and then subtract the lesser coefficient from the greater.

S E C T.

S E C T. II.

S U B T R A C T I O N.

§ 11. RULE. Change the signs of the subtrahend, (or suppose them changed) and proceed as in addition.

<i>Ex. 1st.</i> $\begin{array}{r} + 7a \\ + 3a \\ \hline + 3a \end{array}$	2d. $\begin{array}{r} + 9a \\ - 6a \\ \hline + 15a \end{array}$	3d. $\begin{array}{r} - 7a \\ - 3b \\ \hline - 7a + 3b \end{array}$	4th. $\begin{array}{r} a + b \\ a - b \\ \hline 2b \end{array}$
<i>Ex. 5th.</i> $\begin{array}{r} 7ab - ac \\ 3ab + 2ac + bc \\ \hline \end{array}$	6th. $\begin{array}{r} - 15a + 8b + 3c \\ a - 7b + 9c \\ \hline \end{array}$	7th. $\begin{array}{r} a - 2b \\ b - c \\ \hline \end{array}$	8th. $\begin{array}{r} 3a - 4b - 5c \\ 5a - 4b + 3c \\ \hline \end{array}$

S E C T. III.

M U L T I P L I C A T I O N.

§ 12. RULE. Multiply the coefficients, and place down the letters of both factors together. If the signs of the factors be like, (both +, or both —) the sign of the product is +; but if the signs of the factors be unlike, (one of them —, and the other +) the sign of the product is —.

<i>Ex. 1st.</i> $\begin{array}{r} + 7a \\ + 5b \\ \hline + 35ab \end{array}$	2d. $\begin{array}{r} - 6a \\ - 3b \\ \hline + 18ab \end{array}$	3d. $\begin{array}{r} + 8ab \\ - 7c \\ \hline - 56abc \end{array}$	4th. $\begin{array}{r} - 12bc \\ + 9mn \\ \hline - 108bcmn \end{array}$
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§ 13. Powers of the same quantity are multiplied by adding their exponents.

<i>Ex. 1st.</i> $\begin{array}{r} aaa \\ aa \\ \hline aaaaa \end{array}$	or a^3 a^2 $\hline a^5$	2d. $\begin{array}{r} a^2 bc^3 \\ ab^3 c^2 d \\ \hline a^3 b^3 c^5 d \end{array}$
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§ 14. Surd quantities, under the like sign, are multiplied like others, and the product is placed under the same sign. If only part of the factors be under the sign, the same must be carefully distinguished in the product.

Ex. 1st.	2d.	3d.	4th.
$3\sqrt{a}$	$7^3\sqrt{3a}$	$a\sqrt{b}$	$\sqrt{12ab}$
$2\sqrt{b}$	$2^3\sqrt{5b}$	$b\sqrt{c}$	$\sqrt{3a}$
$6\sqrt{ab}$	$14^3\sqrt{15b}$	$ab\sqrt{bc}$	$\sqrt{36aab}$
			or $6a\sqrt{b}$

If the whole or part of the product be a complete power of the same order as the radical sign, the root may be taken and placed without the sign, as is done in Ex. 4th.

§ 15. If one of the factors be a fraction, multiply the numerator by the other factor, and place the produce above the denominator; if both be fractions, multiply the numerators into each other, and the denominators into each other.

Ex. 1st.	2d.	3d.
$\frac{3a}{b} \times 4d = \frac{12ad}{b}$	$\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$	$\frac{ab}{cd} \times \frac{ac}{bc} = \frac{aabc}{bcde} = \frac{aa}{de}$

§ 16. Quantities that occur both in the numerator and denominator of the product, may be cancelled from both, as is done in example 3d, see Part I. § 126; and any fraction multiplied by its denominator, produces the numerator thus, $\frac{a}{b} \times b = \frac{ab}{b} = a$

§ 17. If the multiplicand consist of more terms than one, we must multiply each term separately, according to the foregoing directions.

Ex. 1st.	2d.
$7a + 3b - 5c$	$9a - 3b^2 + \sqrt{b} - \frac{a}{b} - \frac{a}{c}$
$2d$	$-3bd$
$14ad + 6bd - 10cd$	$-27abd + 9b^3d - 3bd\sqrt{b} + 3ad + \frac{3abd}{c}$

§ 18. If the multiplier be compound, we must multiply successively by each term, and add the products.

Ex. 1st.	2d.	3d.
$a + 3b$	$a + b$	$a - b$
$2a + 5b$	$a - b$	$c - d$
$2aa + 6ab$	$aa + ab$	$ac - bc$
$+ 5ab + 15bb$	$-ab - bb$	$-ad + bd$
$2aa + 11ab + 15bb$	$aa \dots - bb$	$ac - bc - ad + bd$

§ 19. It is obvious, that when the signs of both factors are positive, the sign of the product is positive; and, it is easy to apprehend, that when one of the factors is negative, the sign of the product must be negative. But, it seems paradoxical, that two negative factors should give a positive product. To explain this, since we can have no idea of negative numbers, except in connection with positive ones, let us suppose it required to multiply $a-b$ by $c-d$, where a represents a number greater than b , and c represents a number greater than d . We have therefore to find how much the difference of the two first will amount to, when repeated as many times as there are units in the difference of the two last; and this will be obtained by multiplying first by c and then by d , and subtracting the latter product from the former.

Now, $a-b$, multiplied by c , produces $ac-bc$.

$a-b$, multiplied by d , produces $ad-bd$.

The product required is equal to the excess of the first of these above the second. The quantity to be subtracted from the former, consists of the difference of two others; and, were we to subtract the greater, without attending to the lesser, we would subtract too much, and leave too small a remainder; but, if we subtract the greater and add the lesser, we shall diminish the minuend by the exact difference, and obtain a remainder equal to the product required; which is $ac-bc-ad+bd$, and therefore, $-b$, multiplied into $-d$, produces $+bd$.

$$1. 5a-7b+4c$$

by $3ad$

$$2. 3ab-5cd+bef+7gh$$

by $5ag$

$$3. ab+9bc+7bcd - \frac{a}{b}$$

by $7bc$

$$4. aa+ab+bb$$

by $3a-3b$

$$5. x^2+xy+y^2$$

by x^2-xy+y^2

$$6. 3x+4y+5z$$

by $3x-4y-5z$

$$7. \frac{a-b}{b-c}$$

by $\frac{a-c}{b}$

$$8. a^2+a+\sqrt{a}$$

by $b^2+b+\sqrt{a}$

S E C T. IV.

D I V I S I O N.

§ 20. RULE. Place the divisor in the form of a denominator, under the dividend; cancel like quantities from both; and divide the coefficients, when it can be done without a remainder.

$$\text{Ex. 1. } 3a \div 4b = \frac{3a}{4b} \quad \text{Ex. 2. } 8a \div 4b = \frac{2a}{b} \quad \text{Ex. 3. } 3ab \div 6bc = \frac{a}{2c}$$

When

When the signs of both terms are alike, the sign of the quotient is +; but, when the signs of the terms are unlike, the sign of the quotient is —. This follows from the rule given for the signs in multiplication.

§ 21. Powers of the like quantities are divided by subtracting the exponents.

Ex. 1. $a^3 \div a^2 = a$

Ex. 2. $+a^3b^2c^4 \div -a^2b^2c = -ac^3$

§ 22. To divide fractions, multiply the numerator of the dividend by the denominator of the divisor for the numerator of the quotient, and the denominator of the dividend by the numerator of the divisor for the denominator of the quotient. If either of the terms be a whole quantity, it may be reduced to the form of a fraction by placing 1 for the denominator.

Ex. 1st. $4ab \div \frac{2c}{d} = \frac{2abd}{c}$

Ex. 2d. $\frac{a}{b} \div 3c = \frac{a}{3bc}$

Ex. 3d. $\frac{4a}{3b} \div \frac{7c}{d} = \frac{4ad}{21bc}$

§ 23. Surd quantities under the same radical sign are divided as others, and the quotients placed under that sign.

Ex. 1. $\sqrt{10ab} \div \sqrt{2a} = \sqrt{5b}$

Ex. 2. $3ac\sqrt{7ab} \div 6c\sqrt{b} = \frac{a\sqrt{7a}}{2}$

§ 24. If the dividend be a compound quantity, the terms are divided separately by the divisor.

Ex. $9ab^3 \div (6abc - 3a^2b + 5b^4c - ab) = \left(\frac{2c}{3b^4} - \frac{a}{3b^4} + \frac{5bc}{9a} - \frac{1}{9b^3} \right)$

§ 25. If the divisor be compound, it is placed under the dividend, and no quantity can be expunged unless it occur in every term, both of the dividend and divisor; nor can any coefficient be divided, except by a number which measures all the other coefficients.

If the divisor and dividend be expressed by the same letters, a quotient will sometimes be obtained, by proceeding as in the following example.

Ex. $(a+b)a^3 + 4a^2b + 4ab^2 + b^3 \div (a^2 + 3ab + b^2)$

$$\begin{array}{r} a^3 + a^2b \\ \hline + 3a^2b + 4ab^2 + b^3 \\ + 3a^2b + 3ab^2 \\ \hline + ab^2 + b^3 \\ + ab^2 + b^3 \\ \hline 0 \end{array}$$

Here we divide the first term of the dividend a^3 by the first term of

of the divisor a , and this gives a^2 , which we place as the first term of the quotient sought. Then we multiply the divisor by that term, and subtract the product from the dividend, and proceed in the same manner with the remainder as a new dividend.

§ 26. Sometimes the division will never terminate without a remainder; but, in this case, the terms are generally related to each other in such a manner, that, after obtaining a few, the quotient may be continued to any length without further trouble.

$$\text{Ex. } x-a)x \quad \left(1 + \frac{a}{x} + \frac{a^2}{x^2}, \text{ \&c.}\right.$$

$$\begin{array}{r} x-a \\ \hline +a \\ +a-\frac{a^2}{x} \\ \hline +\frac{a^2}{x} \end{array}$$

Here the quotient is an infinite series, whose terms consist of the powers of a , in their order, divided by the powers of x .

- | | | |
|-----------|---|-------------|
| 1. Divide | $3ab$ | by $9ac$ |
| 2. | $12a^3c$ | by $4a^2b$ |
| 3. | $3a^3b+4a^2b^2+ab^3$ | by $2a^2bd$ |
| 4. | ax^3+bx^2+cx | by $abcx$ |
| 5. | $\frac{ab}{c} - \frac{bc}{a} + \frac{6ac}{b}$ | by $2ab$ |
| 6. | $2a^2+2ab+3ab^2+3b^3$ | by $a+b$ |
| 7. | a^4-b^4 | by $a-b$ |
| 8. | $a+b$ | by $a-b$ |

S E C T. V.

P R O P O R T I O N.

§ 27. When two quantities are compared, in order to find how often the first contains the second, the relation observed is called their ratio, and is measured by the quotient of the first divided by the second. Thus, the ratio of 8 to 2 is measured by $\frac{8}{2}$ or 4; the ratio of 3 to 5, by $\frac{3}{5}$; and the ratio of a to b by $\frac{a}{b}$. If the first be greater than the second, the measure of the ratio is a whole or mixed number; but, if the first be less than the second, the measure of the ratio is a proper fraction.

When the first of four quantities has the same ratio to the second that

that the third has to the fourth, the quantities are said to be in geometrical proportion; and this is represented as in Part I. § 78.

$$\text{Thus, } a : b :: 3 : 5 \\ a : b :: c : d$$

Quantities expressed in this form are called analogies.

The first and last terms, a and d , are called the extremes.

The second and third terms, b and c , are called the means.

The first and third terms, a and c , are called the antecedents.

The second and fourth terms, b and d , are called the consequents.

The two antecedents are said to be homologous to each other, and the two consequents to each other.

The following theorems may be inferred from the nature of geometrical proportion:

§ 28. I. If four quantities a, b, c, d , be in geometrical proportion, the product of the means ad is equal to the product of the extremes cb .

For the measures of the ratios $\frac{a}{b}$ and $\frac{c}{d}$ are equal, and, if these be multiplied by bd , the product $\frac{abd}{c} = \frac{cbd}{d}$ or $ad=cb$.

§ 29. II. If the product of two quantities ad be equal to the product of two others bc , the quantities are proportional: A factor of the first product to a factor of the second, as the remaining factor of the second to the remaining factor of the first.

For $ad=cb$, which, if we divide both products by bd , becomes $\frac{ad}{bd} = \frac{cb}{db}$ or $\frac{a}{b} = \frac{c}{d}$: Wherefore $a : b :: c : d$.

§ 30. III. If four quantities, a, b, c, d , be proportional, the product of the means divided by either extreme, quotes the other extreme: For $ad = bc$, by Theorem II.; and, if we divide these by a , we obtain $d = \frac{bc}{a}$; but, if we divide them by d , we obtain

$a = \frac{bc}{d}$. This theorem is the foundation of the Rule of Three, Part I. § 79.

§ 31. IV. If four quantities, a, b, c, d , or 12, 8, 9, 6, be proportional, they will continue proportional under the following variations:

1 st , $b : a :: c : d$	8 : 12 :: 6 : 9	Euclid V. B. <i>Invertendo</i> .
2 ^d , $a : c :: b : d$	12 : 9 :: 8 : 6	16. <i>Alternando</i> .
3 ^d , $a + b : b :: c + d : d$	20 : 8 :: 15 : 6	18. <i>Componendo</i> .
4 th , $a - b : b :: c - d : d$	4 : 8 :: 3 : 6	17. <i>Dividendo</i> .
5 th , $a : a - b :: c : c - d$	12 : 4 :: 9 : 3	E. <i>Convertendo</i> .
6 th , $a + c : b + d :: a : b$	21 : 14 :: 12 : 8	12.
7 th , $a - b : c - d :: a : b$	3 : 2 :: 12 : 8	19.

For,

For, in all these cases, the product of the means is equal to that of the extremes. Thus, we obtain the same conclusions which are demonstrated in the fifth Book of Euclid on other principles.

CHAPTER III.

INVOLUTION AND EVOLUTION.

SECTION I.

INVOLUTION.

§ 32. **I**NVOLUTION is the operation of raising powers, and is performed by successive multiplication. Any number or quantity multiplied into itself produces the square of the same, and that product multiplied into the original quantity, produces the cube of the same; and so on.

Simple quantities are involved by multiplying their exponent by that of the power required, and prefixing the like power of the coefficient. Thus, the square of $3a$ is $9a^2$; the cube of $2b$ is $8b^3$; the cube of ab^2 is a^3b^6 ; and the fourth power of $3ab^2c^3$ is $81a^4b^8c^{12}$.

If the sign of the root be positive, the signs of all the powers are also positive; but, if the sign of the root be negative, the signs of the even powers are positive, and the signs of the odd powers negative. Thus, the square of $-a$ is $+a^2$, the cube is $-a^3$, the fourth power $+a^4$, the fifth power $-a^5$; and so on.

§ 33. The nature of the powers of compound quantities will appear from the following examples:

Required the square, cube, biquadratic, and sursolid powers of $a+b$, or any two quantities connected by the sign $+$, called a BINOMIAL.

$$a+b$$

$$\begin{array}{l}
 \times \quad a+b = \text{root} \\
 \times \quad \begin{array}{r} a+b \\ \hline a^2+ab \\ \quad +ab+b^2 \\ \hline a^2+2ab+b^2 = \text{square, or 2d power.} \end{array} \\
 \times \quad \begin{array}{r} a^2+2ab+b^2 \\ \hline a+b \\ \hline a^3+2a^2b+ab^2 \\ \quad +a^2b+2ab^2+b^3 \\ \hline a^3+3a^2b+3ab^2+b^3 = \text{cube, or 3d power.} \end{array} \\
 \times \quad \begin{array}{r} a^3+3a^2b+3ab^2+b^3 \\ \hline a+b \\ \hline a^4+3a^3b+3a^2b^2+ab^3 \\ \quad +a^3b+3a^2b^2+3a^2b+b^4 \\ \hline a^4+4a^3b+6a^2b^2+4ab^3+b^4 = \text{biquadratic, or 4th power.} \end{array} \\
 \times \quad \begin{array}{r} a^4+4a^3b+6a^2b^2+4ab^3+b^4 \\ \hline a+b \\ \hline a^5+4a^4b+6a^3b^2+4a^2b^3+ab^4 \\ \quad +a^4b+4a^3b^2+6a^2b^3+4ab^4+b^5 \\ \hline a^5+5a^4b+10a^3b^2+10a^2b^3+5ab^4+b^5 = \text{furfold, or 5th power.} \end{array}
 \end{array}$$

Required the square and cube of $a-b$, or any two quantities connected by the sign $-$, called a RESIDUAL.

$$\begin{array}{l}
 \times \quad a-b = \text{root} \\
 \times \quad \begin{array}{r} a-b \\ \hline a^2-ab \\ \quad -ab+b^2 \\ \hline a^2-2ab+b^2 = \text{square} \end{array} \\
 \times \quad \begin{array}{r} a^2-2ab+b^2 \\ \hline a-b \\ \hline a^3-2a^2b+ab^2 \\ \quad a^2b+2ab-b^3 \\ \hline a^3-3a^2b+3ab^2-b^3 = \text{cube} \end{array}
 \end{array}$$

It appears from these examples, that all the terms of the powers of binomials are positive, but the terms of the powers of residuals are positive and negative by turns. In all other respects, the powers of binomials and residuals are alike.

The number of terms in each power is more by 1 than the exponent of the power. In the first term, the exponent of the quantity

tity a is the same as that of the power required; it decreases regularly by 1 through the following terms, and is wanting altogether in the last. On the contrary, b is wanting in the first term; in the second its exponent is 1, and increases regularly by 1 through the following terms, and is equal to that of the power required in the last. In all the terms, the sum of the exponents of a and b is equal to that of the power.

The coefficient of the first term is always 1. The coefficient of the second term is the same as the exponent of the power. The coefficient of each term is obtained by multiplying that of the former by the exponent of a in the same, and dividing the product by the exponent of b in the term whose coefficient is required.

SECTION II.

EVOLUTION.

§ 34. EVOLUTION is the operation of extracting roots, or discovering quantities, by whose successive multiplication given quantities are produced.

The roots of simple quantities are extracted by dividing their exponents by the exponent of the root required. Thus, the square root of a^4 is a^2 , the cube root of b^6 is b^2 , and its square root b^3 . If a numeral coefficient be prefixed to the given quantity, its root must be extracted. Thus the square root of $9a^2$ is $3a$, and the cube root of $8b^6$ is $2b^2$.

§ 35. Evolution is opposed to Involution; and rules for extracting the roots of compound quantities and numbers are inferred from a review of the steps by which the powers are raised.

Thus, we observe that the square of $a+b$ is $a^2+2ab+b^2$, or that the square of the sum of two quantities is equal to the sum of their squares, together with twice their product; and therefore, when a quantity is proposed, whose square root consists of two parts, we inquire for the first part, and subtract the square of the same from the given quantity. The remainder is equal to the product of twice the part found multiplied by the part sought, together with the square of the part sought; and is thereby easily discovered.

For example, let the square root of $a^2+6ax+9xx$ be required. We inquire for the square root of a^2 , which is a , and makes the first part of the root sought; then, subtracting the square of a from the given quantity, the remainder is $6ax+9x^2$; and this contains the product of the remaining part of the root multiplied by $2a$, together with the square of the same part: Hence $2a$, together with the part sought, multiplied by the part sought, will produce $6ax+9x^2$; consequently, that quantity divided by $2a$, together with the part sought, will quote the part sought. This leads us to an uncertain kind of division, because the divisor is not fully known. However,

we divide $6ax$, the first term of the dividend, by $2a$, the known part of the divisor, and the quotient $3x$ may be tried for the remaining part of the root sought. If we have conjectured right, the divisor completed is $2a+3x$, which, multiplied by the quotient $3x$, produces the dividend. The operation will stand as under;

	Proof.	
	$a^2+6ax+9x^2(a+3x$	$a+3x$
	a^2	$a+3x$
$2a+3x$)	$6ax+9x^2$	a^2+3ax
$\times 3x$)	$6ax+9x^2$	$+3ax+9x^2$
0	$a^2+6ax+9x^2$	

§ 36. We might proceed, in like manner, to investigate the method of extracting the higher roots of algebraic quantities, and of proceeding when the root consists of more terms than two. But, as this is of less general use, we shall go on to lay down the rules for extracting the roots of numbers, which are inferred from an examination of the powers of algebraic quantities.

The following table exhibits the squares, cubes, and fourth and fifth powers of the 9 digits:

Root	1	2	3	4	5	6	7	8	9
Square	1	4	9	16	25	36	49	64	81
Cube	1	8	27	64	125	216	343	512	729
Biquadratic	1	16	81	256	625	1296	2401	4096	6561
Surfsolid	1	32	243	1024	3125	7776	16807	32768	59049

From this table, the square root of any number under 100, the cube root of any number under 1000, the biquadratic root of any number under 10000, and the surfsolid root of any number under 100000, is found in the nearest integers. Since the square of 10 is 100, and the square of 100 is 10000, it follows, that the squares of all numbers from 10 to 100 consist of more than two, but not above four places; and, because the square of 1000 is 1000000, the squares of all numbers from 100 to 10000 consist of more than four, but not above six places; and the square of any number never exceeds twice as many places as the root. In like manner, because the cube of 10 is 1000, and the cube of 100 is 1000000, the cubes of all numbers from 10 to 100 consist of more than three, and not above six places; and the cube of any number never exceeds three times as many places as the root, nor is ever so low as twice that number. In general, if m represent the exponent of the power, and n the number of places in the root, the number of places in the power never exceeds mn , nor falls so low as $mn-n$. Hence the following

RULE. When it is proposed to extract a root of any number, divide it into periods of two figures for the square root, of three for the

the cube root, and as many places for the other roots as there are units in the exponent; beginning at the unit place. The number of periods points out how many places there are in the root.

§ 37. RULE for extracting the SQUARE ROOT.

1st, Find the square root of the first period, and place it as the first figure of the root sought.

2d, Subtract the square of the figure found from the first period, and to the remainder, if any, bring down the second period. The number thus formed is called the *resolvend*.

3d, Double the part of the root found, and divide the *resolvend* thereby, neglecting the right-hand figure; the quotient is to be tried for the next figure of the root.

4th, Annex the quotient also to the divisor, and multiply the number thus made up by the quotient.

5th, Subtract the product from the *resolvend*, and bring down the next period to the remainder. This forms a new *resolvend*. Proceed as before, till all the periods be used.

Ex. 1. Required the square root of 3969?

$$\begin{array}{r}
 \begin{array}{r}
 3969(63 \text{ root} \\
 \underline{36} \\
 123) 369 \\
 \times 3) 369 \\
 \hline
 0
 \end{array} \\
 \text{Proof } 63 \\
 \quad 63 \\
 \hline
 \quad 189 \\
 \quad 378 \\
 \hline
 \quad 3969
 \end{array}$$

Here we inquire the nearest square root of the first period 39, which is 6; then we subtract its square, or 36, and annex the next period, 69, to the remainder, which completes the *resolvend* 369; then we divide 36, neglecting the last figure 9, by twice 6, or 12, and place the quotient 3 in the root. We also annex it to the 12, and multiply the number thus made up, 123, by the quotient 3, and subtract the product from the *resolvend*; and, because there is no remainder, the root is exactly 63.

If the product exceed the *resolvend*, we must subtract 1 from the quotient; and, if it still exceed, we must diminish the quotient continually by 1, and try it again till it answer.

Ex. 2. Required the square root of 729?

$$\begin{array}{r}
 \begin{array}{r}
 729(27 \text{ root} \\
 \underline{4} \\
 47) 329 \\
 \times 7) 329
 \end{array}
 \end{array}$$

Here 4 could be obtained 8 times in 32, but 48 multiplied by 8 would exceed the *resolvend*; therefore we subtract 1, and try 7, which answers.

Ex. 3. Required the square root of 43264?

43264

$$\begin{array}{r} \dots \\ 43264(208 \text{ root} \\ 4 \\ \hline 408)3264 \\ \times 8)3264 \\ \hline \end{array}$$

Here the first divisor 4 cannot be obtained from 3; therefore we place a cypher in the root, which gives 40 for a new divisor, and annex another period to the resolvend.

Ex. 4. Required the square root of 50865424?

$$\begin{array}{r} \dots \\ 50865424(7132 \\ 49 \\ \hline \text{First divisor } 141 \text{) } 186 \text{ First resolvend} \\ \times 1 \quad 141 \\ \hline \text{Second divisor } 1423 \text{) } 4554 \text{ Second resolvend} \\ \times 3 \quad 4269 \\ \hline \text{Third divisor } 14262 \text{) } 28524 \text{ Third resolvend} \\ \times 2 \quad 28524 \\ \hline 0 \end{array}$$

§ 38. The foregoing rule is inferred from the terms which compose the square of a binomial. If a be placed for the tens and b for the units; then the given number is represented by $a^2 + 2ab + b^2$; and, after the square of the tens is subtracted, the remainder is represented by $2ab + b^2$, that is, it contains twice the product of the units and tens, together with the square of the units; and, if it were divided by $2a + b$, would quote b . This, however, cannot be directly done, since the value of b is still unknown; but, since $2a$ is always considerably greater than b , the quotient of the resolvend divided by $2a$ will generally lead to the value of b , which, being annexed to $2a$, or twice the tens, completes the divisor $2a + b$. In Ex. 1st, $a = 60$, $a^2 = 3600$, $2ab + b^2 = 369$, $2a = 120$, $b = 3$, $2a + b = 123$, $a + b = 63$. Some of the cyphers are neglected in the operation, to save writing.

If the root consists of more places than two, let a represent the part already found, and b the figure sought, the operation is continued in the same manner, and for the same reason as before.

§ 39. RULE for extracting the CUBE ROOT.

1st, Find the cube root of the first period in the nearest integer, and place it as the first part of the root sought.

2d, Subtract the cube of the figure found from the first period, and to the remainder bring down the next period, which forms the resolvend.

3d, Multiply the square of the root by 3, and inquire how often the product is contained in the resolvend, neglecting the two right hand figures. The quotient is to be tried for the next figure of the root.

4th, Multiply three times the square of the first part of the root by this quotient, annexing two cyphers to the product; also multiply three times the first part of the root by the square of the quotient, annexing a cypher to the product; then find the cube of the quotient, and add these three numbers together.

5th, Subtract this sum from the resolvend; and, if there be more periods, annex the next to the remainder, which makes up a new resolvend; and proceed as before.

Ex. 1. What is the cube root of 373248?

	$\begin{array}{r} 373248(72 \\ 343 \\ \hline 7^2 \text{ or } 49 \times 3 = 147) \quad 302 48 \text{ resolvend} \\ \text{Subtract} \\ 7^2 \text{ or } 49 \times 300 \times 2 = 29400 \\ 7 \times 30 \times 2^2 \text{ or } 4 = 840 \\ 2^3 \text{ or } 2 \times 2 \times 2 = 8 \\ \hline 30248 \\ \hline 0 \end{array}$	$\begin{array}{r} \text{Proof } 72 \text{ root} \\ 72 \\ \hline 144 \\ 504 \\ \hline 5184 \\ 72 \\ \hline 10368 \\ 36288 \\ \hline 373248 \text{ cube.} \end{array}$
--	---	--

Ex. 2. What is the cube root of 253395799552?

	$\begin{array}{r} 253395799552(6328 \text{ root} \\ 216 \\ \hline \text{First divisor } 6^2 \text{ or } 36 \times 3 = 108) \quad 373 95 \\ \text{Subtract} \\ 6^2 \text{ or } 36 \times 300 \times 3 = 32400 \\ 6 \times 30 \times 3^2 \text{ or } 9 = 1620 \\ 3^3 \text{ or } 3 \times 3 \times 3 = 27 \\ \hline 34047 \\ \text{Subtract} \\ \text{Second divisor } 63^2 \times 3 = 11907) \quad 33487 99 \\ \text{Subtract} \\ 63^2 \times 300 \times 2 = 2381400 \\ 63 \times 30 \times 2^2 \text{ or } 4 = 7560 \\ 2^3 \text{ or } 2 \times 2 \times 2 = 8 \\ \hline 2388968 \\ \hline 959831 \end{array}$	$\begin{array}{r} \text{First resolvend} \\ \text{Quotient } 3 \\ \hline \text{Second resolvend} \\ \text{Quotient } 2 \\ \hline \text{Third} \end{array}$
--	--	--

Third divisor $632^2 \times 3 = 1198272$) $9598315|52$ Third resolvend
Subtract Quotient 8

$$\begin{array}{r} 632^2 \times 300 \times 8 = 958617600 \\ 632 \times 30 \times 8^2 \text{ or } 64 = 1213440 \\ 8^3 \text{ or } 8 \times 8 \times 8 = 512 \\ \hline 959831552 \\ \hline 0 \end{array}$$

Ex. 3. What is the cube root of 48625125?

$$\begin{array}{r} \begin{array}{l} \text{First divisor} \\ \text{Subtract} \end{array} \quad 27 \quad)216|27 \quad \begin{array}{l} \text{First resolvend} \\ \text{Quotient 7 or 6} \end{array} \\ \begin{array}{l} 3a^2b = 16200 \\ 3ab^2 = 3240 \\ b^3 = 216 \\ \hline 19656 \end{array} \\ \hline \begin{array}{l} \text{Second divisor} \\ \text{Subtract} \end{array} \quad 3888 \quad)19711|25 \quad \begin{array}{l} \text{Second resolvend} \\ \text{Quotient 5} \end{array} \\ \begin{array}{l} 3a^2b = 1944000 \\ 3ab^2 = 27000 \\ b^3 = 125 \\ \hline 1971125 \\ \hline 0 \end{array} \end{array}$$

The operation admits some contractions, but we shall leave them as an exercise to the learner's invention.

§ 40. To explain the reason of the foregoing rule, we shall first take the case where the root consists of 2 places. Let a represent the ten place, and b the unit place. Then the given number will be represented by $a^3 + 3a^2b + 3ab^2 + b^3$ (see § 33.); and, if we subtract a^3 , or the cube of the first period, the resolvend will be represented by $3a^2b + 3ab^2 + b^3$; that is, it will consist of 3 times the square of the tens multiplied by the units, together with 3 times the tens multiplied by the square of the units, together with the cube of the units; and the first of these quantities will always be considerably greater than the other two. And, since $3a^2b$, which represents the greater part of the resolvend, divided by $3a^2$, quotes b ; therefore, if we divide by thrice the square of the tens, we shall obtain a number to make trial of for the units, and which generally answers. Then we collect the values of $3a^2b$, $3ab^2$, and b^3 ; and, if the sum of these be equal to the resolvend, the exact root is extracted. In Ex. 1st, $a=70$, $a^3=343000$, $3a^2b+3ab^2+b^3=30248$ the resolvend, $3a^2=14700$ the divisor, $b=2$, $3a^2b=29400$, $3ab^2=840$, and

and $b^3=8$. As the first figure 7 represents tens, it is necessary to annex a cypher to any number obtained from its product.

If the root consists of 3 or more places, the places found being represented by a , and the next place by b , it may be inferred, as before, that the resolvend contains $3a^2b+3ab^2+b^3$, or three times the square of the part found multiplied by the figure sought, together with three times the part found multiplied by the square of the figure sought, together with the cube of the figure sought.

§ 41. If the learner understands the foundation of this rule, he will be able to investigate rules for the extraction of other roots. For example, if the sursolid root of any number of two periods be required, and a placed to represent the tens, and b the units, as before, the number will be represented by $a^5+5a^4b+10a^3b^2+10a^2b^3+5ab^4+b^5$; and, when a^5 , or the greatest sursolid number in the first period, is subtracted, the remainder will be represented by $5a^4b+10a^3b^2+10a^2b^3+5ab^4+b^5$, of which $5a^4b$ is considerably greater than the rest. Therefore, if we divide by $5a^4$, the quotient may be tried for b , or the unit-place; and the trial is made by collecting the values of the foregoing terms, and comparing their amount with the resolvend.

If the powers of $a+b$ be carried on further, they will serve as the foundation of rules for extracting roots of any dimension.

In general, we find the root of the first period, and subtract the power of the same from the given number; the remainder is the resolvend. The divisor is found by raising the part of the root already obtained to the power whose exponent is less by unity than that of the root sought, and multiplying the same by the exponent of the root sought. The quotient is to be tried for the next figure; and the trial is made by collecting the values of all the terms in the power of $a+b$, except the first. If their sum exceed the resolvend, the quotient must be diminished as directed in extracting the square root. The learner will perceive that there must be as many cyphers annexed to each term as there are units in the exponent of a .

§ 42. When there is a remainder, after all the periods of the given number are brought down, the root may be continued to a decimal, by annexing periods of cyphers, to any degree of exactness required; but the root can never be completed: For, any fraction, or mixed number, multiplied into itself, produces another fraction or mixed number; and, therefore, the root of an integer, which cannot be exactly expressed in integers, can never be exactly expressed in fractions.

Roots of vulgar fractions are found, by extracting the root of the numerator for a new numerator, and the root of the denominator for a new denominator. Thus, the square root of $\frac{25}{64}$ is $\frac{5}{8}$.

Roots of decimals are extracted like those of integers. If the decimal repeats or circulates, periods of the repeating or circulating figures are annexed to the remainder.

§ 43. If the exponent of the root required be a composite number,

ber, it is easier to divide the operation, and extract successively the roots whose exponents are the component parts. Thus, the biquadratic root is found by extracting the square root, and again extracting the square root of the same. The 6th root is found by extracting the square root of the cube root, or the cube root of the square root.

Required,

1. The square root of 5184
2. of 105625
3. of 54756
4. of 1522756
5. of 25010001
6. of 287296
7. of 184041
8. of 3742986
9. The cube root of 531441
10. of 373248
11. of 830584
12. of 48627125
13. of 27270901
14. of 700227072
15. of 1879080904
16. of 559476224
17. The biquadratic root of 20763
18. of 151807041
19. The sursolid root of 4084101
20. The sixth root of 887503681
21. The square root of 272.25
22. of .444
23. of .015625
24. of $\frac{11}{288}$
25. The cube root of .010648
26. of .014
27. of .037,
28. of $\frac{1111}{3375}$

C H A P . IV.

E Q U A T I O N S .

§ 44. **A**n Equation is a proposition which affirms the equality of certain quantities. An unknown quantity may be variously combined with others, and affected by the algebraical symbols; and its value is discovered by altering the form of the equation till it stand single and unaffected on one side, and be compared with known quantities on the other.

The

The alterations which may be made on the form of equations, depend on the following principles:

If equal quantities be added to equal, the sums are equal.

If equal quantities be subtracted from equal, the remainders are equal.

If equal quantities be multiplied by equal, the products are equal.

If equal quantities be divided by equal, the quotients are equal.

Like powers of equal quantities are equal.

Like roots of equal quantities are equal.

§ 45. RULES for resolving EQUATIONS.

I. If the unknown quantity be divided by any other, multiply both sides of the equation by the divisor. Thus, if $\frac{x}{3}=5$, then $x=15$.

II. If the known and unknown quantities be mixed, transpose the terms, till all those which contain the unknown quantity stand on one side of the equation, and those which contain known quantities only stand on the other.

A term is said to be transposed when we cancel it from one side of an equation and write it on the other with the opposite sign; by doing which, we subtract it from both sides of the equation. Thus, if $x+5=12$, then $x=12-5$, or 7; and, if $x-8=14$, then $x=8+14$, or 22.

III. If the unknown quantity be multiplied by any other, divide both sides of the equation by the multiplier. Thus, if $3x=18$, $x=6$.

IV. If the unknown quantity be under the radical sign, remove the sign, and raise the other side of the equation to the corresponding power. If $\sqrt{x}=7$, then $x=49$.

V. If the unknown quantity be a square, a cube, or other power, extract the like root of the other side of the equation, which gives the value of the root sought. Thus, if $x^3=64$, then $x=4$.

§ 46. In the following examples, these rules are used promiscuously as the case requires.

Example 1.

	Equation	Proof.
	$\frac{x}{3} + \frac{x}{5} + \frac{x}{2} = 52$	3)60(20
		5)60(12
		2)60(30
		—
		62
Multiplied by 3	$x + \frac{3x}{5} + \frac{3x}{2} = 156$	
Multiplied by 5	$5x + 3x + \frac{15x}{2} = 930$	
Multiplied by 2	$10x + 6x + 15x = 1860$	
or	$31x = 1860$	
Divided by 31	$x = 60$	

Ex.

Example 2d.

$$\begin{array}{l} 5x-7=3x+9 \\ \text{Transpose } -7 \quad 5x=3x+9+7 \\ \text{Transpose } 3x \quad 5x-3x=9+7 \\ \text{or} \quad 2x=16 \\ \text{Divide by } 2 \quad x=8 \end{array}$$

Example 3d.

$$\begin{array}{l} \sqrt{x+2}=16-\sqrt{x} \\ \text{Transpose } 2 \quad \sqrt{x}=14-\sqrt{x} \\ \text{Transpose } -\sqrt{x} \quad 2\sqrt{x}=14 \\ \text{Divide by } 2 \quad \sqrt{x}=7 \\ \text{Square} \quad x=49 \end{array}$$

Example 4th.

1st. Equ.			$3x^2+8=232-\frac{x^2}{2}$
2d,	1st,	$\times 2$	$6x^2+16=464-x^2$
3d,	2d,	-16	$6x^2=448-x^2$
4th,	3d,	$+x^2$	$7x^2=448$
5th,	4th,	$\div 7$	$x^2=64$
6th,	5th,	$\sqrt{\quad}$	$x=8$

Here the second equation is found by multiplying the first by two; the third by subtracting 16 from the second; the fourth by adding x^2 to the third; the fifth by dividing the fourth by 7; and the sixth by extracting the square root of the fifth. It is useful for beginners to number the equations, and to use marginal directions, either in words, as in the three first examples, or by the algebraic symbols, as in the last, to explain the operation.

Examples for Practice.

1. $\frac{x}{3} + \frac{x}{4} + \frac{x}{6} + \frac{x}{8} + \frac{x}{12} = 46$
2. $\frac{3x}{5} - \frac{2x}{7} - \frac{x}{15} = 26$
3. $\frac{x-2}{4} + \frac{x-1}{5} + \frac{x+1}{3} + \frac{x+2}{7} = 24$
4. $\frac{x-2}{3} - \frac{x+4}{8} = \frac{x}{4} + \frac{x}{5} - 6$
5. $\frac{x+4}{10} + \frac{2x}{9} = \frac{x}{3}$
6. $100 - \frac{x}{2} - \frac{x}{7} = 6x + \frac{x}{2}$
7. $100 - 3x = 50 - \frac{x}{3}$

$$8. \quad x^2 + 42 = 285 - 2x^2$$

$$9. \quad x^3 - 20 = 100 - x^3 + \frac{x^3}{8}$$

$$10. \quad \sqrt{2x + \frac{x}{2}} = \frac{x}{2}$$

$$11. \quad \sqrt{40x + \frac{x}{3}} = 3x + \frac{2x}{3}$$

$$12. \quad \sqrt{16x} \sqrt{\frac{x}{2}} = 8$$

RULES for the SOLUTION of QUESTIONS.

§ 47. I. When there is only one unknown quantity; form a clear idea of the nature of the question, and express the terms in algebraic characters, marking a letter for the unknown quantity. This forms an equation, which is resolved by the foregoing rules:

Ex. 1. A person being asked his age, answers, that, if $\frac{1}{4}$ of his age be multiplied by $\frac{1}{6}$ of his age, the product is equal to his age.

Call his age x years

Proof.

Then $\frac{1}{4}$ of his age is $\frac{x}{4}$

Age 24 years.

And $\frac{1}{6}$ of the same $\frac{x}{6}$

$\frac{1}{4}$ of age 6
 $\frac{1}{6}$ of age 4

And by question $\frac{x}{4} \times \frac{x}{6} = x$

Product 24

That is, $\frac{xx}{24} = x$

Mult. by 24 $xx = 24x$

Divide by x $x = 24$

Ex. 2. A person, after trading 4 years, was possessed of L. 3240. The first year he gained $\frac{1}{6}$ of his original stock; the second $\frac{1}{4}$; the third $\frac{1}{3}$; and the fourth $\frac{1}{2}$ of the same. How much did he begin with?

Suppose the original stock x pounds

Then the first year's gain is $\frac{x}{6}$

Second year's gain $\frac{x}{4}$

Third year's gain $\frac{x}{3}$

Fourth year's gain $\frac{x}{2}$

Sum of these $x + \frac{x}{6} + \frac{x}{4} + \frac{x}{3} + \frac{x}{2} = 3240$ by quest.

Mult.

$$\begin{array}{l} \text{Mult. by 12,} \quad 12x + 2x + 3x + 4x + 6x = 38880 \\ \text{Or} \quad 27x = 38880 \\ \text{Divide by 27} \quad x = 1440 \end{array}$$

Proof.

Original stock	-	-	L. 1440
First year's gain $\frac{1}{5}$	-	-	240
Second year's gain $\frac{1}{4}$	-	-	360
Third year's gain $\frac{1}{3}$	-	-	480
Fourth year's gain $\frac{1}{2}$	-	-	720
			L. 3240

Ex. 3. Two travellers set out at the same time from Edinburgh and London, whose distance is 390 miles; one travels 18 miles, and the other 12 miles a day. Required when they will meet, and how far each travels?

Suppose they meet in x days

The first travels $18x$ miles

The other travels $12x$ miles

Their sum $30x = 390$ by quest.

Divide by 30 $x = 13$

Therefore they meet in 13 days

The first travels 13×18 or 234 miles

The second travels 13×12 or 156 miles

Whole journey 390 miles

§ 48. II. When a proportion is given, it may be turned into an equation by multiplying the means into each other, and the extremes into each other. See § 29.

Ex. 1. A and B began trade with equal stocks; A gained L. 200, and B lost 100; after which A's stock was to B's as 3 to 2.

Suppose they begin each with x pounds

A's stock will be increased to $x + 200$

And B's diminished to $x - 100$

Now by question $x + 200 : x - 100 :: 3 : 2$

From which, by above rule, $2x + 400 = 3x - 300$

Transpose $2x$ $400 = x - 300$

Transpose -300 $700 = x$

Proof.

A begins with	L. 700
Gains	200

His stock then is L. 900

B begins with L. 700
Loses 100

His stock then is L. 600 Now, $900 : 600 :: 3 : 2$

Ex. 2. Two tradesmen, A and B, are employed on a piece of work, which A could perform in 15 hours, and B in 10. In what time will they do it working together?

Suppose they will do it in x hours; then the part of the work done by each is to the whole, as the time he is employed along with the other to the time in which he would finish it alone;

That is, $15 : x :: 1 : \text{part done by A} = \frac{x}{15}$ See § 30.

$10 : x :: 1 : \text{part done by B} = \frac{x}{10}$

But, since A and B together do the whole $\frac{x}{15} + \frac{x}{10} = 1$

Mult. by 60 $4x + 6x = 60$

or $10x = 60$

Divide by 10 $x = 6$

Proof.

A, who would do the whole in 15 hours, does $\frac{6}{15}$ in 6 hours.

B, who would do the whole in 10 hours, does $\frac{6}{10}$ in 6 hours.

Now $\frac{6}{15} + \frac{6}{10} = \frac{24}{60} + \frac{36}{60} = 1$, or the whole.

§ 49. III. When there are two unknown quantities, the conditions of the question must be such as to afford two equations. State the equations, using letters for the unknown quantities; then find a value of one of these quantities from each equation, and form a new equation, by placing these values equal to each other. This last equation contains only one unknown quantity, and is resolved as before.

In stating these equations, if the sum of the unknown quantities be equal to 20, we write $x + y = 20$

If their difference be 12, then $x - y = 12$

If their product be 64, then $xy = 64$.

If their quotient be 4, then $\frac{x}{y} = 4$

If their proportion be as 3 to 4, then $x : y :: 3 : 4$, and $4x = 3y$.

Other conditions are stated in like manner.

Ex. 1. Required two numbers; whose difference is 8, and 3 times the greater is equal to 5 times the lesser?

Write x for the greater, and y for the lesser.

1st Equ. First condition $x - y = 8$

2d Second condition $3x = 5y$

3d 1st transposing y $x = 8 + y$

4th

4th Equ.	2d divided by 3	$x = \frac{5y}{3}$
5th	3d and 4th compared	$8 + y = \frac{5y}{3}$
6th	5th multiplied by 3	$24 + 3y = 5y$
7th	6th transposing $3y$	$24 = 5y - 3y = 2y$
8th	7th divided by 2	$12 = y$
9th	8th and 3d compared	$20 = x$
Proof.	3 times $20 = 60$, and 5 times $12 = 60$	

Instead of working as above, we may take 2 values of y , by comparing which an equation will arise, wherein x is the only unknown quantity.

Ex. 2. There are three contiguous inclosures; the middle one contains 25 acres. If it be joined to the inclosure on the east, by removing a hedge, it will be three times as large as that on the west; but, if joined to that on the west, it will only be twice as large as that on the east. Required the extent of each?

Suppose the east inclosure contains x , and the west one y acres,

1st Equ.	East and middle contain	$x + 25 = 3y$
2d	West and middle contain	$y + 25 = 2x$
3d	1st transp. + 25	$x = 3y - 25$
4th	2d divided by 2	$x = \frac{y+25}{2}$
5th	3d and 4th compared	$3y - 25 = \frac{y+25}{2}$
6th	5th mult. by 2	$6y - 50 = y + 25$
7th	6th transposed	$5y = 75$
8th	7th divided by 5	$y = 15$
9th	8th and 2d compared	$15 + 25 = 2x$
10th	9th divided by 2	$20 = x$

Proof.

East inclosure	20 acres	West inclosure	15
Middle inclosure	25	Middle inclosure	25
$45 = 15 \times 3$		$40 = 20 \times 2$	

This rule is founded on the obvious principle, that two quantities which are equal to the same quantity are equal to each other. The operation may be contracted by substituting a value of one of the quantities derived from the first equation, instead of that quantity itself in the second equation. Thus, because $x = 3y - 25$; if we write $3y - 25$, instead of x in the second equation, it becomes $y + 25 = 3y - 25 \times 2 = 6y - 50$.

Ex. 3. A grocer has some tea which cost 17s. per lb. and some which costs 12s. and wants to mix them, so that he may have 100 lb. which shall cost 15s. per lb. How much shall he take of each?

Suppose

Suppose he takes x lb. of the best, and y lb. of the other, then the value of the best will be $17x$ shillings, and of the second $12y$ shillings.

1st, condition $x + y = 100$ the quantity.

2d, condition $17x + 12y = 1500$ the value of 100 lb. at 15s.

1st, transposed $x = 100 - y$

2d, divided by 17 $x = \frac{1500 - 12y}{17}$

values of x compared $100 - y = \frac{1500 - 12y}{17}$

which multiplied by 17 $1700 - 17y = 1500 - 12y$

and transposed $200 = 5y$

and divided by 5, $40 = y$

whence, from 1st equ. $60 = x$

Proof.

40 lb. at 12s. L. 24

60 lb. at 17s. 51

100 lb. at 15s. L. 75

§ 50. The foregoing rule is general : But there are often shorter and more elegant methods of resolving the question, which are best learned by experience.

Thus, the first equation of the foregoing example, multiplied by 17, becomes

$$17x + 17y = 1700$$

from which subtract the second equ.

$$17x + 12y = 1500$$

remainder

$$5y = 200$$

whence

$$y = 40$$

Ex. 4. Required two numbers whose difference is 3, and the difference of their squares 99.

1st, First condition $x - y = 3$

2d, Second condition $x^2 - y^2 = 99$

3d, 1st, transposed $x = y + 3$

4th, 2d, transposed $x^2 = y^2 + 99$

5th, 3d, squared $x^2 = y^2 + 6y + 9$

6th, 4th and 5th compared $y^2 + 99 = y^2 + 6y + 9$

7th, 6th, subtracting y^2 $99 = 6y + 9$

8th, 7th, transposed $90 = 6y$

9th, 8th, divided by 6 $15 = y$

10th, 1st and 9th compared $18 = x$

Proof.

$$18 \times 18 = 324$$

$$15 \times 15 = 225$$

difference 99

In this example, the first equation gives a value of x , and the second

second gives a value of x^2 ; it is therefore necessary to square the values of x obtained from the first, in order to compare it with the value of x^2 obtained from the second. The like method must always be used when the conditions of the questions give values of the unknown quantity in different dimensions.

Ex. 5. Required two numbers, whose product is 96, and whose sum is equal to 5 times their difference?

1st		$xy = 96$	Proof.
2d		$x+y = 5x - 5y$	$12 \times 8 = 96$
3d	$1st \div y$	$x = \frac{96}{y}$	$12 + 8 = 20$
4th	$2d - x$	$y = 4x - 5y$	$12 - 8 = 4 \times 5 = 20$
5th	$4th + 5y$	$6y = 4x$	
6th	$5th \div 4$	$\frac{6y}{4} = x$	
7th	$6th, 3d$	$\frac{6y}{4} = \frac{96}{y}$	
8th	$7th \times 4y$	$6y^2 = 384$	
9th	$8th \div 6$	$y^2 = 64$	
10th	$9th \sqrt{\quad}$	$y = 8$	
11th	$10th, 1st$	$x = 12$	

§ 51. IV. When there are three unknown quantities, the question must contain conditions for three equations; by comparing which, two equations may be formed that involve only two unknown quantities; and these are resolved by the last rule.

Ex. Required three numbers, whose sum is 48, and three times the first, together with five times the second, and four times the third, amount to 186; and one third of the first, together with one fifth of the second, and one fourth of the third, amount to 13?

1st condition $x + y + z = 48$

2d condition $3x + 5y + 4z = 186$

3d condition $\frac{x}{3} + \frac{y}{5} + \frac{z}{4} = 13$

1st value of x $x = 48 - y - z$

2d ditto $x = \frac{186 - 5y - 4z}{3}$

3d ditto $x = 39 - \frac{3y}{5} - \frac{3z}{4}$

1st and 2d values compared $48 - y - z = \frac{186 - 5y - 4z}{3}$

1st and 3d values compared $48 - y - z = 39 - \frac{3y}{5} - \frac{3z}{4}$

Which, reduced, become

$$y = \frac{42 - z}{2}$$

And

$$y = \frac{180 - 5z}{8}$$

Values

Values of y compared

$$\frac{180 - 5z}{8} = \frac{42 - z}{2}$$

Which, multiplied by 8

$$180 - 5z = 168 - 4z$$

And transposed

$$12 = z$$

Whence

$$15 = y$$

And

$$21 = x$$

Here we find three values of x from the three equations; and, by comparing the first value with the others, we form two new equations, in which there are no unknown quantities beside y and z ; and, by comparing these, an equation is obtained, where z is the only unknown quantity. This method always answers, but is often tedious. In the foregoing process, some of the intermediate steps are omitted. We shall now resolve the question by a different method.

1st condition mult. by 60

$$60x + 60y + 60z = 2880$$

2d condition mult. by 20

$$60x + 100y + 80z = 3720$$

3d condition mult. by 180

$$60x + 36y + 45z = 2340$$

Difference of 1st and 2d

$$40y + 20z = 840$$

of 2d and 3d

$$64y + 35z = 1380$$

1st difference mult. by 8

$$320y + 160z = 6720$$

2d difference mult. by 5

$$320y + 175z = 6900$$

Difference of these equations

$$15z = 180$$

Whence

$$z = 12$$

§ 52. If there be four or more unknown quantities, there must be an equal number of conditions or equations given; and, by comparing the values of the quantities sought, obtained from the several equations, we shall always at last arrive at an equation which contains only one unknown quantity.

Sometimes the operation is greatly facilitated by assuming fewer letters than there are quantities sought, and expressing the value of the others by their relations derived from the terms of the question.

V. INDETERMINATE QUESTIONS.

§ 53. When there are more quantities sought than conditions given, the question admits of an unlimited number of answers: But the answers in integers are generally restricted to a certain number: Sometimes there is only one, sometimes none at all. All these varieties may be investigated by means of algebra; but the manner of proceeding can scarcely be reduced to general rules, and must be collected from a careful examination of the nature and limits of each question, assisted by practice. As this subject is of less general use, we shall only give one example as a specimen, referring those who desire further information to Dodson's Mathematical Repository, and other treatises.

Ex. Required to mix three kinds of spirits, at 28d. at 30d. and at 40d. so as to make up 100 gallons at 36d.?

Let $x, y,$ and $z,$ represent the number of gallons of the several kinds.

1st	Then the whole quantity	$x + y + z = 100$
2d	The whole value	$28x + 30y + 40z = 3600$
3d	1st multiplied by 40	$40x + 40y + 40z = 4000$
4th	2d subtracted from 3d	$12x + 10y = 400$
5th	4th transposed and divided	$x = \frac{400 - 10y}{12}$
6th	And	$y = 40 - \frac{6x}{5}$

We may infer from the 5th equation, since $400 - 10y$ cannot be greater than 390, that x cannot be greater than $32\frac{1}{2}$; and, from the 6th equation, since y is a whole number, that $\frac{6x}{5}$ must be also a whole number; and therefore x is either 5, or a multiple of 5. The question therefore admits of the six following answers:

$x =$	5	10	15	20	25	30	
$y =$	34	28	22	16	10	4	by 6th equation.
$z =$	61	62	63	64	65	66	by 1st equation.

We might have begun by ascertaining the limits for any of the unknown quantities; and, if we had chosen $z,$ we should have found a limit which it could not fall below, as well as one it could not exceed.

VI. AFFECTED QUADRATIC EQUATIONS.

§ 54. When an equation is properly transposed and cleared, it either exhibits the value of the unknown quantity, or some of its powers; or the unknown quantity is connected with one or more of its powers. If the unknown quantity occurs in more dimensions than one, the equation is said to be AFFECTED. Thus, if the square of the unknown quantity be joined to some product of the same, it is called an affected quadratic equation. For example, $xx + 3x = 40,$ or $xx - 3x = 10.$

It appears from § 33, that the square root of $x^2 + 2ax + a^2$ is $x + a,$ and the square root of $x^2 - 2ax + a^2$ is either $x - a,$ or $a - x.$ Therefore, if the side of a quadratic equation can be reduced to either of these forms, it may be resolved by extracting the square root of both sides, which reduces it to a simple equation.

RULE 1st, Transpose the equation, so that the terms which involve the unknown quantity may stand on one side, and divide it by the coefficient of the square of the unknown quantity, if any.

2d, Add to both sides the square of half the coefficient of the unknown quantity.

3d, Extract the square root of both sides. The square root of the side which involves the unknown quantity, is equal to the unknown quantity, with the half coefficient subjoined.

4th, Transpose the half coefficient, which gives the value of the quantity sought.

Ex. 1. Required two numbers whose difference is 6, and the difference of their cubes 2232?

1st condition	$x - y = 6$
2d condition	$x^3 - y^3 = 2232$
3d 1st transposed	$x = y + 6$
4th 2d transposed	$x^3 = y^3 + 2232$
5th 3d cubed	$x^3 = y^3 + 18y^2 + 108y + 216$
6th 4th and 5th	$y^3 + 2232 = y^3 + 18y^2 + 108y + 216$
7th 6th transposed	$18y^2 + 108y = 2016$
8th Rule 1st	$y^2 + 6y = 112$
9th Rule 2d	$y^2 + 6y + 9 = 121$
10th Rule 3d	$y + 3 = 11$
11th Rule 4th	$y = 8$
12th 11th and 1st	$x = 14$

Here the work is carried on to the 8th step, by the method formerly explained; and this produces an affected quadratic equation, which we divide by 18, the coefficient of y^2 ; and obtain another equation, in which the coefficient of y is 6. We complete the square, by adding 9, or the square of 3, which is half the foregoing coefficient, to both sides.

Ex. 2. A drover buys a parcel of cattle for L. 180; there are two of them stolen; in consequence of which the remaining ones stand him each L. 1 more than at first. Required the number of cattle?

Suppose x cattle bought, then the price of each is $\frac{180}{x}$, the number remaining is $x - 2$, and the price they stand $\frac{180}{x - 2}$.

Then by question	$\frac{180}{x} + 1 = \frac{180}{x - 2}$
Mult. by $xx - 2x$	$180x + xx - 360 - 2x = 180x$
Transpose	$xx - 2x = 360$
Complete the square	$xx - 2x + 1 = 361$
Extract the square root	$x - 1 = 19$
Transpose	$x = 20$

Ex. 3. Required a number whose product by 12 exceeds its square by 32?

Condition	$xx = 12x - 32$
Transpose	$xx - 12x = -32$
Complete square	$xx - 12x + 36 = 36 - 32 = 4$
Extract square root	$x - 6 = 2$
or	$6 - x = 2$
Transpose	$x = 8$
or	$x = 4$

Proof.

$$\begin{array}{r} 8 \times 12 = 96 \\ 8^2 = 64 \\ \hline \end{array}$$

$$\begin{array}{r} \text{or } 4 \times 12 = 48 \\ 4^2 = 16 \\ \hline \end{array}$$

Remainder 32

Remainder 32

This

This question, and others of the same form, admit of two answers, for the square root of $xx-12x+36$ may either be $x-6$, or $6-x$. And all quadratic equations have two solutions, if the nature of the question admit a negative answer.

§ 55. If the unknown quantity in any equation occur in two dimensions, and the exponent of the greater be exactly double the exponent of the lesser, it may be reduced to a quadratic equation by substituting a letter for the lower power of the unknown quantity. Thus, if $x^6+12x^3=1053$, we put $y=x^3$, whence $y^2+12y=1053$.

In other cases, the resolution of higher affected equations is difficult, and, often, an approximation is all that can be obtained. It would lead us beyond the limits of our plan to enter on that subject.

Questions.

1. A man has 5 sons, and gives each a present of as many guineas as he is years old. There was two years betwixt the birth of each, and the money given amounted to 80 guineas. Required their ages?
2. Two neighbouring gentlemen, A and B, had equal estates, but A lived above his income, and contracted annually L. 60 of debt, while B lived frugally, and saved L. 80 yearly; by which means, after 12 years, B was twice as rich as A. Required the value of their estates?
3. A man leaving 3 sons and 4 daughters, ordered by his will that his eldest son should have twice as much as any of his younger sons, and his eldest daughter twice as much as any of his younger daughters; and that his younger sons should have as much among them as his younger daughters. Required how his money (which amounted to L. 4400), ought to be divided?
4. The number of burials, in the year 1772, at London, Paris, Amsterdam, and Edinburgh, was all together 59207. If there had been 20 more at Amsterdam, there would have been nine times as many as at Edinburgh; and, if there had been 844 more at Paris, and 5825 less at London, there would have been twice as many at each of these places as at Amsterdam. Required the number in each?
5. Four tradesmen join to build a house, which costs L. 1000; B pays L. 60 more than A; C pays as much as A and B together; and D pays one third of what was paid by B and C together. How much does each pay?
6. A grazier has 220 beasts of different kinds; 15 oxen more than horses, and thrice as many sheep as oxen and horses together. Required how many of each kind?
7. A messenger being dispatched on a journey, travels 30 miles a-day, and, after 9 days, another is dispatched to overtake him, who travels 48 miles a-day. In what time will he overtake him?

8. A person lost $\frac{1}{2}$ of his money at game, then won 4 shillings; and again lost $\frac{1}{4}$ of what he had; then won 3 shillings, and again lost $\frac{1}{2}$ of what he had; after which there only remained the one half of what he began with. Required how much it was?

9. A woman bought some eggs at 3 a penny, and an equal quantity at 2 a penny, and sold them all at 5 for twopence; but, instead of getting back her money (as she expected), she lost sixpence on the parcel. Required how many eggs there were?

10. A trader, who lived at the rate of L. 100 a-year, in three years doubled his stock, and his gain each year was $\frac{1}{3}$ of the stock he had at the beginning of the same. Required how much he began with?

11. A cistern can be filled with water from one cock in 12 hours, and from another in 8. In what time will it be filled by both cocks running together?

12. Two men, A and B, working together, perform a piece of work in 8 days; A could have done it alone in 12 days. In what time could B have done it?

13. Three men can do a piece of work, the first in 50 hours, the second in 60 hours, and the third in 75 hours. In what time will they do it all working together?

14. A and B together can do a piece of work in 12 hours, A and C in 20, and B and C together in 15 hours. In what time will all three do it?

15. The same things being given, required in what time each person can do it separately?

16. A gentleman distributing money to some poor people, found that, if he gave each half a crown, he would have 5 s. over, but, if he gave each 3 s. he would want 4 s. Required the number of poor?

17. The paving of a square court at 6d. a yard cost as much as the inclosing at 5 s. a yard. Required its extent?

18. An army being drawn up in a square, there were 79 men over; but, in attempting to enlarge each side of the square by one man, there were 80 too few. Required the number of men in 2 rank, and altogether?

¶ 19. Required two numbers whose sum is 63, and difference 27?

20. Required two numbers whose difference is 14, and their proportion as 5 to 7?

21. Required two numbers, such that 5 times the greater, together with three times the lesser, may amount to 133, and 4 times the greater together with 6 times the lesser, may amount to 146?

22. Required two numbers, such that 5 times the greater may be 4 more than 9 times the lesser, and 7 times the greater may be 2 more than 13 times the lesser?

23. Required two numbers, such that $\frac{1}{2}$ of the first, together with

with $\frac{1}{7}$ of the second, may amount to 36 and $\frac{1}{7}$ of the first, together with $\frac{1}{7}$ of the second, may amount to 34?

24. Required two numbers, whose sum is nine times greater than their difference, and the amount of twice the greater, together with thrice the lesser, is 88?

25. Required two numbers, whose quotient is 5 and product 180?

26. Required two numbers, whose difference is 5, and the difference of their squares 205?

27. Required two numbers, whose proportion is 2 to 3, and the sum of their squares 325?

28. Required two numbers, whose proportion is as 4 to 5, and the sum of their cubes 5103?

29. 504 bolls wheat were mixed from a cargo at 21 s. and another at 17 s. 6 d. in such proportion that the value was 19 s. Required how much of each kind?

30. Required to mix 50 lb. tea at 9 s. with some at 14 s. and some at 8 s. in order to make up 100 lb. at 10 s.?

31. A mixture of gold and silver weighs 170 ounces, and its specific gravity is 15. Required how many ounces of each metal it contains, the specific gravity of gold being 19, and of silver $10\frac{1}{2}$?

32. A mixture of gold and silver contains 170 inches, and its specific gravity is 15. Required how many inches of each metal it contains, their specific gravities as in last question?

33. A sum of L. 30 was paid in half-guineas and half-crowns. The number of pieces paid was 80. Required the number of each?

34. A gentleman has a chaise valued at L. 48, and two pair horses; the value of the chaise and horses when the best pair is yoked is thrice as much as the other pair, but when the worst pair is yoked, only twice as much. Required the value of the horses?

35. A vessel containing 200 cubical inches is filled with a mixture of wine and spirits, the specific gravity of the wine is .950, of the spirits .858, and of the mixture .881. Required how much of each?

36. A hare, 30 of her leaps before a greyhound, takes 4 leaps for the greyhound's 3, but 2 of the greyhound's leaps are equal to 3 of the hare's. How many leaps must each take before the greyhound catch the hare?

37. A son asked his father how old he was, who answered, that 5 years ago I was thrice as old as you, but, if we live 5 years longer, I shall be only twice as old as you. Required their ages?

38. Two persons discoursing of their money, says A to B, if you will give me L. 20, I shall have as much as you; but B replies, if you will give me L. 20, I shall have twice as much as you. Required how much each had?

¶ 39. Required 3 numbers, such that if the first be taken from the sum of the second and third, the remainder may be 13? If the second be taken from the sum of the first and third, the remainder may be 23; and, if the third be taken from the sum of the first and second, the remainder may be 27?

40. Required 3 numbers, such that 3 times the first, together with 4 times the second, and 5 times the third, may amount to 154; 5 times the first, together with 6 times the second and 9 times the third, to 244; and 4 times the first, together with twice the second and 7 times the third, to 139?

41. Required to mix three ingredients, whose values are 12 s. 15 s. 20 s. so that there may be 3 lb. more of the second than of the first, and that the whole mixture may weigh 60 lb. and be worth 18 s. per lb.?

42. Required 3 numbers, such that the product of the first and second may be 96, of the first and third 60, and of the second and third 40?

43. Required four numbers, such that the continued product of all but the first is 924, of all but the second 792, of all but the third 504, and of all but the fourth 462?

¶ 44. Required to mix 72 bushels corn at 60d. with some at 48d. and some at 42d. so that the mixture may be worth 54.?

45. How many ways may L. 100 be paid in guineas and crowns?

¶ 46. Required two numbers whose difference is 6, and product 720?

47. Required two numbers whose sum is 40, and their product 48 times their difference?

48. Required two numbers whose difference is 3, and the sum of their squares 185?

49. Required two numbers whose difference is 2, and the product of their sum multiplied by the greater 84?

50. Required two numbers whose sum is 30, and product 224?

51. Required two numbers whose sum is 16, and the sum of their squares 130?

52. Required two numbers whose product is 108, and sum of their squares 225?

53. Required a number, whose square being subtracted from its product by 10, leaves a remainder of 16?

54. A gardener and his lad being at work, each digs a square piece of ground whose side is as many feet long as the labourer is years old. They digged together 1040 square feet, and the difference of their ages was 12 years. Required their ages, and the quantity dug by each?

55. An oblong pond was surrounded by a terrace walk 7 yards broad, the pond measured 15000 square yards, and the walk 3696 square yards. Required the length and breadth of the pond?

C H A P. V.

LOGARITHMS.

§ 56. **A** RANK of numbers, whose differences are equal, is termed a series in ARITHMETICAL PROGRESSION; as 2, 4, 6, 8, where the common difference is 2; or 3, 6, 9, where the common difference is 3.

A rank of numbers whose ratios are equal, is termed a series in GEOMETRICAL PROGRESSION, as 1, 2, 4, 8, where the common ratio is 2; or 3, 9, 27, where the common ratio is 3.

§ 57. If d denote the common difference of an arithmetical progression, whose first term is 0, and r denote the common ratio of a geometrical progression, whose first term is 1, the successive terms of the progressions will, in general, be represented as under:

Arithmetical progression 0, d , $2d$, $3d$, $4d$, $5d$, $6d$, $7d$.

Geometrical progression 1, r , r^2 , r^3 , r^4 , r^5 , r^6 , r^7 ,

where we may observe, that the coefficients of d , in the arithmetical progression, are equal to the exponents of r in the geometrical progression.

Now, if d be interpreted by 1, and r by 4, the foregoing progressions will become,

Arithm. prog. 0, 1, 2, 3, 4, 5, 6, 7.

Geom. prog. 1, 4, 16, 64, 256, 1024, 4096, 16384.

Let it be required to multiply 64 by 256: The term in the arithmetical progression corresponding to 64 is 3; and therefore it may be represented by r^3 , and, for the same reason, 256 may be represented by r^4 . Their product is therefore represented by r^7 by § 13. and will stand under 7 in the arithmetical progression, where we find 16384.

§ 58. LOGARITHMS are artificial numbers, by the assistance of which several operations in arithmetic are performed with more ease and dispatch; and addition, in particular, supplies the place of multiplication. Their nature and use may be explained by considering the foregoing progression.

Let any two progressions, the one arithmetical, and the other geometrical, be extended, and the corresponding terms arranged in a table, and let it be required to multiply two terms of the geometrical progression; instead of performing that operation, we may add the corresponding terms of the arithmetical progression, and, against their sum in the table, we shall find the product required. Thus, the

the terms of the former progression answer the purposes of logarithms with respect to the terms of the latter.

The learner will perceive the reason of this, by comparing the foregoing general progressions, and will apprehend the use of such a table as we have described in facilitating multiplication, providing both factors occur in the same geometrical series. But he may justly suspect that this will seldom happen, and that the use of such a table will be confined to a few instances. In order to render it of general use, we shall point out a method of supplying this deficiency.

§ 59. If we interpose between each term of an arithmetical progression a new term, the difference between which and the foregoing and following terms is equal, we shall obtain a new arithmetical progression, where the common difference is one half of the difference in the original progression. Thus, we may obtain 0, $\frac{1}{2}$, 1, $1\frac{1}{2}$, 2, &c. where the common difference is $\frac{1}{2}$. The intermediate terms are found, by adding half the common difference to the preceding ones, or by taking half the sum of the terms between which they are interpolated.

Also, if we interpose a new term between each term of a geometrical progression, which is a geometrical mean between foregoing and following terms, we shall obtain a new geometrical progression, where the common ratio is equal to the square root of the ratio in the original progression. Thus, we may obtain 1, 2, 4, 8, 16, &c. where the common ratio is 2. The intermediate terms are found, by multiplying the preceding ones into the square root of the common ratio, or by extracting the square root of the product of the terms between which they are interpolated.

Thus, we obtain two new progressions adapted to each other, which contain more numbers, and are therefore of more use than the former ones. These progressions may be interpolated in like manner by new terms; and the same may be continued by repeating the operation till every integer occur in the geometrical progression, and its logarithm be found in the corresponding term of the arithmetical progression.

Logarithms were calculated in a manner similar to this by the first inventors. Other methods have since been discovered, easier in practice, but depending on principles which require a knowledge of the higher parts of mathematics, and therefore cannot be explained in this place.

It is only necessary to calculate the logarithms of prime numbers. The logarithms of composite numbers are obtained by adding the logarithms of their component parts.

§ 60. The foregoing observations are inferred from general principles, and therefore may be applied to any progressions whatever. In the common tables of logarithms, the arithmetical progression, 0, 1, 2, 3, &c. is chosen as the simplest, and the geometrical

progreſſion, 1, 10, 100, 1000, &c. as the moſt convenient. The correſpondent terms of theſe progreſſions are as follows :

Log.	0,	1	2,	3,	4,	5,
No.	1,	10,	100,	1000,	10000,	100000.

Hence it appears, that the logarithm of 1 is 0, the logarithm of 10 is 1, of 100 is 2, of 1000 is 3; and, in general, the logarithm of 1, with cyphers annexed, is equal to the number of cyphers. Alſo, the logarithm of any number under 10 is a proper decimal fraction; the logarithm of any number from 10 to 100 is 1, with a decimal fraction annexed; from 100 to 1000 is 2, with a decimal fraction; and ſo on. The integer in the logarithm is always leſs by one than the places in the correſponding number, and is called the index, becauſe it points out how many figures there are in the number.

§ 61. Problem I. To find the logarithm of any number from the Tables.

The moſt uſeful and convenient form of logarithm tables, extending to 10000, is divided into 10 columns. The natural numbers, from 100 to 1000, are marked on the margin, and 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, are marked above the ſeveral columns.

The logarithms of numbers under 100 are given in their order in the firſt page, and the logarithms of numbers under 1000 are found againſt the number in the left-hand column, titled 0.

To find the logarithm of a number greater than 1000, but leſs than 10000, look for the three higheſt figures in the margin; and, on the ſame line in the column which is titled by the unit figure of the given number, you will find the logarithm required. The index is always one leſs than the number of places.

The logarithms of mixed numbers are found in the ſame manner; but the index is regulated by the integers only. Thus, the logarithm of 7328 is 3.864985, of 732.8 is 2.864985, and of 73.28 is 1.864985.

The logarithms of decimal fractions have negative indexes. If there be no cyphers after the decimal point, the index is — 1. If there be one cypher, the index is — 2; and ſo on. A negative index is added when the logarithm is ſubtracted; and ſubtracted when the logarithm is added.

§ 62. The logarithm of any number under 100000 may be found from tables of fix places, or upwards, as in the following example :

Let the logarithm of 73283 be required ?

When cyphers are annexed to a number, the index of the logarithm increaſes, becauſe the number of places is greater; but the logarithm undergoes no other alteration. Now, the log. of 7328 is 3.864985; wherefore the log. of 73280 is 4.864985

For the ſame reaſon the log. of 73290 is 4.865045

	Difference	60
X		Now

Now, the logarithms of the intermediate numbers will increase nearly alike; and, if we add $\frac{1}{10}$, $\frac{2}{10}$, or $\frac{3}{10}$, of the difference to the logarithm of 73280, we shall obtain the logarithm of 73281, 73282, or 73283.

Above difference	60
Multiplied by unit place	3
$\frac{3}{10}$ of difference	18.0
Log. of 73280 =	4.864985
Log. of 73283 =	4.865003

By a like method, the logarithms of numbers under 1000000 may be found, if the tables extend to 7 places. The differences are sometimes marked in the tables to facilitate this operation.

In larger tables, the logarithms of numbers under 1000000 are obtained by inspection, and those under 1000000 by an operation similar to the foregoing.

§ 63. Problem II. To find the number corresponding to any logarithm from the tables;

Look for the given logarithm, neglecting the index in the tables. Against it, on the margin, you find the three first figures; and, on the top of the column, you find a fourth figure.

If the index be 3, the corresponding number consists of 4 figures, which are found by the above direction. If the index be less than 3, the number of integer places is regulated by the index, and the rest are decimals. Thus, the number corresponding to 3.815312 is 6536, and the number corresponding to 2.815312 is 653.6. If the given logarithm cannot be exactly found in the tables, we take the nearest to it, or, if great accuracy be required, we may find some decimal places, as in the following article.

§ 64. If the index of the logarithm be 4, there are 5 places in the corresponding number. The four first are found as above directed, and the remaining one as in the following example:

Required the number corresponding to	4.597179
The next lower in the tables is the log. of 39550.	597146
The next higher in the tables is the log. of 39560.	597256
Difference between the tabular logarithms	110
Difference between the given logarithm and next lower	33

Then, as the difference of the tabular logarithms (110) is to the difference of the given logarithm and next lower (33), so is the difference between the numbers corresponding to the former (10) to the difference between the numbers corresponding to the latter (3): Therefore the number sought is 39553.

From the work of this example, we may collect the following practical

practical rule for finding the last figure of a number of 5 places corresponding to a given logarithm.

Annex a cypher to the difference between the given log. and next lower, and divide the same by the tabular difference.

§ 65. Problem III. To perform multiplication by logarithms; add the logarithms of the factors; their sum is the logarithm of the product.

Ex. Multiply 125 by 72.

$$\text{Log. of } 125 = 2.096910$$

$$\text{Log. of } 72 = 1.857332$$

$$\text{Product } 9000 \quad 3.954242$$

The reason of this rule is obvious from the nature of logarithms explained above § 58.

§ 66. Problem IV. To perform division by logarithms; subtract the logarithm of the divisor from the logarithm of the dividend; the remainder is the logarithm of the quotient.

Ex. Divide 8928 by 279.

$$\text{Log. of } 8928 = 3.950754$$

$$\text{Log. of } 279 = 2.445604$$

$$\text{Quotient } 32 \quad 1.505150$$

As this rule is the converse of the former, the reason is obvious.

Hence it appears, that the logarithm of a vulgar fraction is obtained by subtracting the log. of the denominator from the log. of the numerator.

§ 67. Problem V. To find a fourth proportional to three given numbers, or to work the rule of three by logarithms;

Add the logarithms of the second and third terms, and, from their sum, subtract the logarithm of the first; the remainder is the logarithm of the term sought.

Ex. $8631 : 7371 :: 7946 :$

$$\text{Log. of 2d term } 7371 = 3.867526$$

$$\text{Log. of 3d term } 7946 = 3.900149$$

$$\text{Log. of 1st term } 8631 = 3.936061$$

$$\text{4th term sought } 6786 \quad 3.831614$$

This rule is formed by combining the two former. See § 30, and, PART I. § 79.

§ 68. Problem VI. To involve numbers by logarithms; multiply the logarithm of the number by the exponent of the power; the product is the logarithm of the power.

Ex. What is the cube of 21?

$$\text{Log. of } 21 = 1.322219$$

3

$$\text{Cube } 9261 \quad 3.966657$$

This rule is inferred from Problem III. ; for involution is effected by repeated multiplication.

§ 69. Problem VII. To extract roots by logarithms; divide the log. of the given number by the exponent of the root; the quotient is the logarithm of the root.

Ex. 1st. What is the square root of 3969?

$$\text{Logarithm of } 3969 = 3.598681$$

$$\text{Root } 63 \quad \frac{1}{2} = 1.799340$$

Ex. 2^d. What is the cube root of 9261?

$$\text{Logarithm of } 9261 = 3.966658$$

$$\text{Root } 21 \quad \frac{1}{3} = 1.322219$$

As this rule is the converse of the former, the reason is obvious.

C H A P. VI.

L I T E R A L E Q U A T I O N S.

§ 70. **I**N Chapter IV. the known quantities are set down in figures as the easiest method to beginners. In this chapter, we shall represent them by letters, which will lead us to general theorems, or rules for solving all questions of the same kind. These theorems point out the method of carrying on a computation more concisely, and with less danger of ambiguity than any directions that can be given in words; and are therefore preferable, even when the rules can be discovered, as sometimes they may, without the help of Algebra.

SECT. I. MISCELLANEOUS PROBLEMS.

§ 71. Ex. 1. A can perform a piece of work in a days, B in b days, and C in c days. In what time will they perform it if all three work together?

Suppose in x days,

Then the part done by A is $\frac{x}{a}$

the part done by B is $\frac{x}{b}$

the

the part done by C is $\frac{x}{c}$

and the whole $\frac{x}{a} + \frac{x}{b} + \frac{x}{c} = 1$

which, multiplied by abc $bcx + acx + abx = abc$

and divided by $bc + ac + ab$ $x = \frac{abc}{bc + ac + ab}$

Rule. Divide the product of the three given times by the sum of the products of any two of them taken separately.

If the times in which A and B could perform it, and the time in which all three could perform it, be given, and the time in which C could perform it be sought, we proceed thus :

Equation mult. by abc as before $bcx + acx + abx = abc$

Transposed $abc - bcx - acx = abx$

Divided by $ab - bx - ax$ $c = \frac{abx}{ab - bx - ax}$

In like manner, if any equation be given, which contains 3 letters or more, it may be reduced till any letter stand singly on one side ; and thereby exhibits the value of that letter, if the values of all the others be known. Thus, as many theorems may be deduced from each equation as there are letters contained in it.

Ex. 2. Given the sum and difference of two quantities. Required a general theorem for determining the quantities ?

$$x + y = s$$

$$x - y = d$$

Which added $2x = s + d, \& x = \frac{s+d}{2}$

Or subtracted $2y = s - d, \& y = \frac{s-d}{2}$

From which theorems we may infer the following rules :

To find the greater, add the sum to the difference, and divide the amount by 2.

To find the lesser, subtract the difference from the sum, and divide the remainder by 2.

Ex. 3. Given the sum of two quantities, and the amount of a multiple of the first added to a different multiple of the second ; sought as before ?

Let x be the quantity which has the greater coefficient, and y the other.

Then

$$x + y = s$$

$$ax + by = m$$

$$\text{1st equation multiplied by } a \quad ax + ay = as$$

$$\text{From which subtract 2d equation} \quad ay - by = as - m$$

And divided by $a - b$

$$y = \frac{as - m}{a - b}$$

By

By a like process

$$x = \frac{m-bs}{a-b}$$

Or in words. To find either quantity, divide the difference between the product of the coefficient of the other quantity multiplied into the given sum, and the given amount of the multiples by the difference of the coefficients.

Ex. If $x+y=20$ then $x = \frac{76-20 \times 2}{5-2} = 12$

And $5x+2y=76$

$$y = \frac{20 \times 5 - 76}{5 - 2} = 8$$

Under this problem are comprehended the following questions :

1st, Given the quantity and value of a mixture consisting of two ingredients, and the value of the ingredients, to find the quantity of each? See § 49. Ex. 3.

2d, Given the specific gravity and weight of a mixture consisting of two ingredients, and the specific gravity of each ingredient, to find the quantity of each? See Qu. 31.

3d, A given sum is paid in two kinds of money. The whole number of pieces and their values are given; sought the number of each kind? See Qu. 33.

The rule for the first of these questions may be thus expressed. Divide the difference between the value of the mixture and the value of a like quantity of either ingredient by the difference of the prices. The quotient is the quantity of the other ingredient.

Qu. 1. Sought a theorem for determining two numbers whose sum and proportion is given?

2. ——— Whose sum and difference of their squares are given?
3. ——— Whose proportion and product are given?
4. ——— Whose proportion, together with the sum of their squares, cubes, or any higher power, are given?
5. ——— Whose sum and product are given?
6. ——— Whose sum, and the sum of their squares, are given?
7. Given the time in which any two of three agents will perform an effect: Required the time in which they will do it separately? also the time in which they will do it all acting together?

8. Sought the values of x and y from the following equations?

$$ax+by=m$$

$$cx+dy=n$$

SECT. II. ARITHMETICAL PROGRESSION.

§ 72. In every arithmetical progression we may observe the five following particulars:

The least term, or a

The greatest term, or z

The common difference, or d

The number of terms, or n

The sum of all the terms, or s

If

If any three of these be given, the other two may be found ; for any arithmetical progression may be represented as under :

1st term, 2d, 3d, 4th, 5th, last.
 $a, a+d, a+2d, a+3d, a+4d, \&c. z$

Where we may observe that the coefficient of d , in every term, is less by 1 than the number of the term ; and therefore,

Theorem I. $z = a + d \times n - 1$

Which theorem involves a, z, d, n , and may be reduced so as to exhibit a value of each in terms of the others. Thus,

Theorem II. $a = z - d \times n - 1$

Theorem III. $d = \frac{z-a}{n-1}$

Theorem IV. $n = \frac{z-a}{d} + 1$

§ 73. Again, the sum of the first and last terms is equal to the sum of the second and last but one ; or, of any two terms equally distant from the extremes : And therefore, if the number of terms be even, the whole series may be divided into pairs, whose sums are equal. Or, if the number of terms be odd, the middle term is equal to half the sum of these pairs. Hence,

Theorem V. $s = a + z \times \frac{n}{2}$ which involves s, a, z, n .

If we substitute the foregoing values of z, a, n , we obtain

Theorem VI. $s = 2a + d \times n - 1 \times \frac{n}{2}$ which involves s, a, d, n .

Theorem VII. $s = 2z - d \times n - 1 \times \frac{n}{2}$ which involves s, z, d, n .

Theorem VIII. $s = \frac{zz - aa}{2d} + \frac{z+a}{2}$ which involves s, a, z, d .

These four last theorems may be thus expressed in words :

Rules for finding the sum of an arithmetical series.

I. When the least and greatest terms, and common difference are given ; multiply the sum of the least and greater by half the number of terms.

II. When the least, number of terms, and common difference, are given ; to twice the least add the product of the common difference multiplied into the number of terms less one, and multiply the sum by half the number of terms.

III. When the greatest, number of terms and common difference are given ; from twice the greatest subtract the product of the common difference multiplied into the number of terms less one, and multiply the remainder by half the number of terms.

IV. When both extremes and common difference are given, divide the difference of the squares of the extremes (or the product of

of their sum and difference) by twice the common difference; and to the quotient add half the sum of the extremes.

§ 74. If we transpose these theorems, so as to obtain values of the several quantities which they involve, we shall obtain three new theorems from each, and these will serve for resolving every case that can be proposed.

Ex. 1. The first term of an arithmetical series is 1, the number of terms 16, and common difference 2. What is the last term, and the sum?

By Theorem I. $z = 1 + 2 \times 16 - 1 = 1 + 2 \times 15 = 31$

By Theorem VI. $s = 2 + 2 \times 16 - 1 \times \frac{16}{2} = 32 \times 8 = 256$

It appears from this example, that the sum of the series of odd numbers, 1, 3, 5, &c. is equal to the square of the number of terms.

Ex. 2. A gentleman buys clothes for his seven sons; the values of the suits increase in arithmetical progression; the youngest's cost 20s. and the whole amounted to 245s.; how much was charged for the eldest?

Here, because a, s, n , are given, and z sought, we take Theorem V. which involves these quantities $s = a + z \times \frac{n}{2}$, which reduced becomes $\frac{2s}{n} - a = z$; and, in the present question, $\frac{245 \times 2}{7} - 20 = 50$ the value of the suit for the eldest.

Ex. 3. A person spent L. 100 the first year he kept family, and afterwards increased his expences each year by L. 14, till he spent in all L. 1192. Sought the number of years?

Here, because a, d, s , are given, and n sought, we take Theorem VI. which involves these quantities $s = 2a + d \times n - 1 \times \frac{n}{2}$ which is reduced by multiplication to $s = \frac{2an + dnn - dn}{2}$, and by transposition and division to $nn + \frac{2a-d}{d}n = \frac{2s}{d}$. This is an affected quadratic equation, and being resolved by completing the square, as directed § 54, gives $n = \frac{\sqrt{8ds + 2a - d^2} - 2a + d}{2d}$; and, in the present question, $\frac{\sqrt{133504 + 34596} - 200 + 14}{28} = 8$ the number of years sought.

Qu. 1. How many strokes does a clock strike in 12 hours?

2. A merchant began trade with L. 1000, and increased his stock equally each year for 10 years, when it amounted to L. 4000. How much was the annual increase?

3. A merchant begins with L. 700, and adds L. 120 annually to his capital. In what time will it amount to L. 2500?

4. A labourer is employed to load a waggon with cabbages planted in a row at a yard distance. How far will he go to fetch 100 by one at a time to the waggon, which is placed within a yard of the first?

5. What is the value of a coppice wood divided into 21 lots, whereof one has been annually cut, allowing for each lot L. 5 for every year since it was last cut?

6. A person spent L. 100 the first year he kept family, but afterwards increased his expences by an equal sum each year; and, after 12 years, his expences altogether amounted to L. 2520. Required the yearly increase, and what he spent last year?

7. A person, whose expences increased in arithmetical progression, found that, in the 15th year of his house-keeping, he spent L. 300, and that his whole expences during these 15 years amounted to L. 3660. Required the yearly increase, and the sum spent the first year?

8. A person began with spending L. 200, and afterwards increased his expences by an equal sum yearly till he spent L. 500 the last year, and L. 4550 altogether. Required the number of years, and annual increase?

SECT. III. GEOMETRICAL PROGRESSION.

§ 74. In every geometrical progression, we may observe the five following particulars: The least term, or a ; the greatest, or z ; the common ratio, or r ; the number of terms, or n ; and the sum of the series, or s . If any three of these be given, the other two may be found:

For the progression may be represented as under:

1st term, 2d term, 3d term, 4th term, 5th term, last.

a ar ar^2 ar^3 ar^4 , &c. z .

Where the exponent of r is always less by one than the number of the term. Hence,

Theorem I. $z = ar^{n-1}$, from which the value of any term may be computed; but the operation is easier by logarithms on the principles explained last chapter; from which we may infer, $\log. z = \log. a + \log. r \times n - 1$; from which we obtain the following rules:

To find the last term of a geometrical series, when the first, the common ratio, and number of terms, is given;

Raise the common ratio to the power whose exponent is less by unity than the number of terms, and multiply that power by the first term.

Or, multiply the logarithm of the common ratio by the number of terms less one, and to the product add the logarithm of the first term; the sum is the logarithm of the last term.

§ 75. The foregoing equation involves a , z , r , n , and may be reduced by division, as under.

Theorem II. $a = \frac{z}{r^{n-1}}$ whence $\text{Log. } a = \text{Log. } z. - \text{Log. } r \times n-1$

Theorem III. $r^{n-1} = \frac{z}{a}$ whence $\text{Log. } r = \frac{\text{Log. } z - \text{Log. } a}{n-1}$

Theorem IV. $n = \frac{\text{Log. } z - \text{Log. } a}{\text{Log. } r} + 1$

§ 76. Again, because $a + ar + ar^2 + ar^3 - - - + ar^{n-1} = s$
multiplied by r , $ar + ar^2 + ar^3 - - - + ar^n = sr$

Difference of these equations $ar^n - a = sr - s$

This divided by $r-1$ quotes Theorem V. $\frac{ar^n - a}{r-1} = s = a \times \frac{r^n - 1}{r-1}$

This theorem involves s, a, r, n , and may be expressed in words as follows :

To find the sum of a geometrical series, whose least term, common ratio, and number of terms is given : Raise the common ratio to the power whose exponent is the number of terms ; multiply this power, less one, by the least term, and divide the product by the common ratio, less one.

§ 77. If we substitute the values of a , and its powers, in the last equation, we obtain,

Theorem VI. $s = \frac{zr^n - a}{r-1}$ which involves s, z, r, a .

Theorem VII. $s = \frac{zr^n - z}{r^n - r^{n-1}}$ which involves s, z, r, n .

These equations being reduced, will give others ; and we may obtain, in most cases, an easier solution by a logarithmical process, upon the principles explained in the last chapter. We must notice, however, that when a, n, s , or z, n, s , are given, the equation which results is an affected one, of a high order, and cannot be resolved by any method explained in this treatise.

Ex. 1. A fir-plant, weight four ounces, increased to triple weight each year ; how much will it weigh at the beginning of the seventh year ?

Here, $a = 4, r = 3, n = 7$, and $n-1 = 6$

By Theorem I. $r = 3$ or $\text{Log. } r (3) = 0.477121$
3 $\times n-1$ 6

$r^3 = 9$ 2.862726

3 $\text{Log. } a (4) = 0.602060$

$r^3 = 27$ $\text{Log. } z (2916) = 3.464786$

27

$r^6 = 729$

$a = 4$

$z = ar^6$ 2916 Answer 2916 oz. or 182 lb. 4 oz.

Ex.

Ex. 2. A drover buys a dozen cattle, and agrees to give 4 d. for the first, a shilling for the second, and to triple the price in like manner on each of the others, what will the dozen amount to?

Here, a , r , n , are given, and s sought; so the operation is regulated by Theorem V. ; and, since $r=3$, or r^n or $r^{12}=531441$, and subtracting 1, the remainder is 531440, which, multiplied by $a=4$ produces 2125760; and this divided by $r-1$, or 2, quotes 1062880 pence, or L. 4428 : 13 : 4.

Ex. 3. A country contained 100,000 inhabitants some years ago, but, by a regular increase of one twentieth part each year, the number is now doubled, or amounts to 200,000; how many years has it required to complete that increase?

Here a is given = 100,000, $z=200,000$, $r=1\frac{1}{20}$, or 1.05, and n , which is sought, may be calculated by Theorem IV.

Log. z (200,000)	5.301030
Log. a (100,000)	5.000000

Log. r (1.05) = 0.021189) 0.301030 (14.2

I

Answer 15.2 years.

§ 78. A decreasing geometrical progression may be represented by $z, \frac{z}{r}, \frac{z}{r^2}, \frac{z}{r^3}$, and the sum by Theorem VI. is $\frac{zr-a}{r-1}$. If the series be indefinitely continued, a becomes less than any assignable quantity, and may therefore be neglected; and the sum becomes $\frac{zr}{r-1}$; and, if $z = \frac{1}{r}$, the sum is $\frac{1}{r-1}$. Thus, the sum of $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}$, is 1, and the sum of $\frac{1}{3}, \frac{1}{9}, \frac{1}{27}$, is $\frac{1}{2}$. These are sums to which the series would approximate to within the smallest limit, if sufficiently continued, but would never exactly complete.

Qu. 1. A grain of wheat being sown, produces 7 grains, which are sown again, and yield the same increase. Required how much it will amount to in 12 years, if the whole crop be always sown, and yield the same increase? and how many bushels, allowing 700,000 grains to a bushel?

2. The Indian who invented the game of chess is said to have asked of the king, who promised him any reward he should demand, that he might have one grain of wheat for the first point of the board, two for the second, and so on, in geometrical progression for all the 64 points. The king, considering that as a small matter, ordered the wheat to be given him. How much will it amount to?

3. If the posterity of Noah, which consisted of six persons at the flood, increased so as to double their number in 20 years, how many inhabitants would there be in the world 2 years before the death of Shem, who lived 502 years after the flood?

4. America was discovered by Columbus in the year 1492. What number of original settlers, increasing at the rate of one in forty each year, would amount to 1000000 in the year 1772?

5. A gamester lost L. 5 at the first game, and doubled the stake each game, in expectation of regaining what he lost; but the luck was always against him; and, at the last game, he lost L. 5120. How much did he lose in all? and how many games did he play?

7. A manufacturer introduces a new branch of business into a country, and takes 5 apprentices, who were bound for 7 years; after which he takes 5 more; and each of his former apprentices takes 5 also; these, in their turn, educate others. Now, supposing none to die, how many will be bred to that branch of business in 42 years?

SECT. IV. INTEREST and ANNUITIES.

§ 79. Interest of two kinds, simple and compound. Simple interest is only computed on the sum originally lent, although it should remain unpaid for several years. Compound interest is computed by accumulating the interest with the principal at the term when it is payable, and charging interest on the amount, during the following period. Thus, if L. 100 be lent at 5 per cent. the amount, including interest, at the end of a year is L. 105, which bears interest during the following year, and consequently the amount at the end of two years is L. 110, 5s. Compound interest is prohibited by law; but as the lender may demand the interest when due, and lend it again, the doctrine of compound is necessary for ascertaining the improvement of money and the value of annuities.

§ 80. The more useful computations in simple interest were explained Part I. § 114-122. Let p represent the principal or sum lent; n the number of years, or fraction of an year; r the rate, or interest of L. 1 for a year; i the interest; and a the amount or sum of principal and interest. It is evident that the interest of any sum for a year is obtained by multiplying the interest of L. 1 by the sum; and the interest for any longer or shorter time is obtained by multiplying the annual interest by the time. Hence we may infer the following theorems:

$$\text{I.} \quad i = prn$$

$$\text{VI. VII.} \quad r = \frac{i}{pn} = \frac{a-p}{pn}$$

$$\text{II. III.} \quad a = i + p = \overline{rn+1} \times p$$

$$\text{VIII. IX.} \quad n = \frac{i}{pr} = \frac{a-p}{pr}$$

$$\text{IV. V.} \quad p = \frac{i}{rn} = \frac{a}{rn+1}$$

$$\text{X.} \quad i = \frac{arn}{rn+1}$$

§ 81. The method of applying these theorems will appear from the following examples:

Ex. 1. What deduction should be allowed on receiving present payment

payment of L. 123 due 10 months hence, allowing interest at 3 per cent. ?

Here $a = 123$, $r = .03$ $n = \frac{10}{12}$; therefore, by Theorem X.

$$i = \frac{123 \times .03 \times \frac{10}{12}}{.03 \times \frac{10}{12} + 1} = \text{L. } 3.$$

In cases of this kind, the interest on the sum instantly paid to the term of payment is deducted from the amount or sum which would be due at that term. This deduction is called the DISCOUNT. By subtracting it from the amount we obtain L. 120, the sum to be instantly paid, which may also be computed by Theorem V.

Ex. 2. In what time will L. 730 amount to L. 1000 at 5 per cent. ?

Here $p = 730$, $a = 1000$, $r = .05$; and by Theorem IX.

$$n = \frac{1000 - 730}{730 \times .05} = \frac{270}{36.5} = 7 \text{ years, } 145 \text{ days.}$$

§ 82. To determine the EQUATION OF PAYMENTS, or the time at which two debts due at different terms may be paid together, without loss either to the borrower or lender.

The method Part I. § 123. is only an approximation, though sufficiently exact for business on most occasions. To obtain a solution on accurate principles, the *discount* upon the second debt at the equated term of payment ought to be equal to the interest of the first debt. If p represent the first debt, a the second, n the interval between the terms of payment, x the interval between the first term and equated payment, then $n - x$ will represent the interval between the equated term and the second; and from Theorems I. and X.

upon the principle just now explained, we obtain $prx = \frac{arn - arx}{rn - rx + 1}$

which being reduced, writing b for $\frac{p+a}{pr} + n$, and c for $\frac{an}{pr}$, becomes
 $x^2 - bx = -c$; and if we resolve the quadratic equation, we obtain $x = \frac{b}{2} \pm \sqrt{\frac{b^2}{4} - c}$.

Ex. There is L. 100 payable a year hence, and L. 210 four years hence. Required the equated term of payment, allowing simple interest at 5 per cent. ?

Here $p = 100$, $a = 210$, $n = 3$, $r = .05$, $b = 65$, $c = 126$, $x = 2$.

§ 83. In COMPOUND INTEREST the successive amounts of any principal, at equal intervals of time, form a series in geometrical progression. Let R be placed for $r+1$, or the amount of L. 1 at the end of one year; then pR will represent the amount of any sum at the end of one year; and, since this is also the principal for the following year, the amount at the end of the second year will be pR^2 ; and, at the end of the third year, pR^3 ; and, at the end of n years, pR^n . Also, if a represent a sum payable at the end of one year, two years, or n years, the present value of the same will

will be $\frac{a}{R}$, $\frac{a}{R^2}$, and $\frac{a}{R^n}$. The following Theorems for solving the several cases in compound interest, are easily inferred from these observations.

- I. $a = pR^n$ and $\text{Log. } a = \text{Log. } p + \text{Log. } R \times n$.
 II. $p = \frac{a}{R^n}$ and $\text{Log. } p = \text{Log. } a - \text{Log. } R \times n$.
 III. $R^n = \frac{a}{p}$ and $\text{Log. } R = \frac{\text{Log. } a - \text{Log. } p}{n}$.
 IV. also $n = \frac{\text{Log. } a - \text{Log. } p}{\text{Log. } R}$.

§ 84. We have reduced these theorems to the form of a logarithmical process, which is more convenient in practice, as will appear from the following examples :

Ex. 1. What is the amount of L. 100 in 3 years, at 4 per cent. compound interest ?

$$\begin{array}{r} R = 1.04 \\ \hline R^2 = 1.0816 \\ \hline R^3 = 1.124864 \\ \hline p = 100 \\ \hline a = 112.4864 \end{array}$$

$$\begin{array}{r} \hline \text{Amount L. } 112:9:9 \end{array}$$

$$\begin{array}{r} \text{Or Log. } R \ 1.04 = 0.0170333 \\ \hline n \quad \quad \quad = 3 \end{array}$$

$$\begin{array}{r} \hline \text{Log. } p \ 100 \quad 2 \\ \hline \end{array}$$

$$\begin{array}{r} \hline \text{Log. } a \quad \quad = 2.0510999 \end{array}$$

$$\text{And } a = \text{L. } 112.486$$

Ex. 2. What sum improved at 5 per cent. compound interest, will amount to L. 1000 in 12 years?

$$\begin{array}{r} \text{Here, by Theorem II. Log. } p = \text{Log. } 1000 - \text{Log. } 1.05 \times 12 \\ \hline \text{Log. } 1.05 = 0.0211893 \\ \hline \end{array}$$

$$\begin{array}{r} \hline \text{Log. } 1000 = 3 \\ \hline \end{array}$$

$$\begin{array}{r} \hline \text{Log. } p \quad \quad = 2.7457284 \end{array}$$

Whence $p = 556.837$, or L. 556:16:9

Ex. 3. At what rate of compound interest will L. 1250 amount to L. 1645 in 7 years?

$$\begin{array}{r} \text{Here, by Theorem III. Log. } r = \frac{\text{Log. } 1645 - \text{Log. } 1250}{7} = \\ \hline 0.017036: \text{ whence } r = 1.04, \text{ and the rate is 4 per cent.} \end{array}$$

Ex. 4. In what time will L. 100 amount to L. 500, at $4\frac{1}{2}$ per cent compound interest?

Here,

Here, by Theorem IV. $n = \text{Log. } \frac{500 - \text{Log. } 100}{\text{Log. } 1.045} = 36.567$,
or 36 years 207 days.

Questions for Practice.

1. What is the amount of L. 1000 at the end of 10 years, reckoning compound interest, at 4 per cent. ?
2. What is the amount of L. 1000 in half a year, at 4 per cent. compound interest ?
3. In what time will any sum be doubled at 4 per cent. compound interest ?
4. At what rate of compound interest will any sum of money double in 15 years ?
5. How much money in hand will compensate a debt of L. 500, due 7 years hence, allowing discount at the rate of 4 per cent. compound interest ?

§ 85. Computations of ANNUITIES, with allowance of compound interest, are founded on the same principles.

The principal sum, which would yield a perpetual annuity of L. 1 at the rate of interest proposed, is called the PERPETUITY, and is equal to $\frac{1}{r}$ or $\frac{1}{R-1}$. Let this be represented by P .

Let A represent an annuity, the payment of which has been fore-born for several years; and let it be required to determine M , the sum which the annuitant ought now to receive as an equivalent, allowing compound interest on each payment since the time it fell due.

The amount of the payment which fell due a year ago is AR ; of that which fell due two years ago AR^2 , and so on. Therefore, $M = A + AR + AR^2 + AR^3$, &c. continued to n terms; the sum of which series, by § 76, is $A \times \frac{R^n - 1}{R - 1} = AP \times \overline{R^n - 1}$; from which the following logarithmic theorems are derived:

- I. $\text{Log. } M = \text{Log. } \overline{R^n - 1} + \text{Log. } A + \text{Log. } P$
- II. $\text{Log. } A = \text{Log. } M - \text{Log. } \overline{R^n - 1} - \text{Log. } P$
- III. $n = \frac{\text{Log. } \overline{Mr + A} - \text{Log. } A}{\text{Log. } R}$

Ex. 1. How much will an annuity of L. 10 amount to, if fore-born for 7 years, allowing compound interest at 4 per cent. ?

Here, $A=10$, $P=25$, $n=7$, $R=1.04$

$$\begin{array}{rcl} \text{Log. } R^n - 1 & (.315931) & = -1.4995922 \\ \text{Log. } P & (25) & = +1.3979400 \\ \text{Log. } A & (10) & = +1.0000000 \end{array}$$

$$\text{Log. } M = \text{L. } 79 \quad \text{nearly} \quad +1.8975322$$

Ex.

Ex. 2. In what time will a pension of L. 10 foreborn amount to L. 79, at 4 per cent. compound interest?

$$A = 10.$$

$$M \times r = 3.16$$

$$\text{Log. } 13.16 = 1.1192559$$

$$\text{Log. } A = 1.000000$$

$$\text{Log. } R \ 1.04 = .0170333 \cdot 1192559 (7 \text{ years.})$$

§ 86. Let it next be required to determine V , the present value of an annuity for a given term of years. This must bear the same proportion to M , the amount of the annuity at the end of the term, that L. 1 bears to R^n , the amount of L. 1, with compound interest during the term. Therefore, $V = \frac{M}{R^n} = AP \times \frac{R^n - 1}{R^n}$, and $\text{Log. } V = \text{Log. } M - \text{Log. } R \times n$.

Ex. Let the present value of an annuity of L. 10 for 7 years, reckoning compound interest at 4 per cent. be required?

$$\text{Log. } M, \text{ or the amount at the end of 7 years,} = 1.8975322$$

$$\text{Log. } R \ (1.04) \cdot 0170333 \times 7 = .1192331$$

$$\text{Log. } V, \text{ or present value of the annuity, } L. 69.02 = 1.7782991$$

The above theorem might have been obtained independent of M , by finding the sum of the series $\frac{A}{R}, \frac{A}{R^2}, \&c.$ The determination of A or n is easily derived from it.

§ 87. If the annuity be only to commence at the expiration of a given number of years, let y represent the number of years that must elapse before it begin, and n the number of years it continues, the present value is $\frac{M}{R^{n+y}} = AP \times \frac{R^n - 1}{R^{n+y}}$. If the annuity be perpetual after its commencement, the value is $\frac{AP}{R^y}$. The investigation of these, and the logarithmic computations, are obvious.

Qu. 1. What is the amount of a pension of L. 100 foreborn 15 years, at 5 per cent. compound interest?

2. What pension will amount to L. 1000 in 15 years, as above?

3. In what time will a pension of L. 50 amount to L. 1000, as above?

4. What is the present value of a pension of L. 100 for 20 years, at 4 per cent. compound interest?

5. A farmer, in obtaining a lease of ground for 25 years, pays a fine or grassum of L. 1000. How much additional rent would have been equal to the same, interest as above?

6. What is the present value of an estate of L. 100, which is

not to be enjoyed till the expiration of 100 years, reckoning compound interest, at 3 per cent.?

7. What is the present value of 60 years possession of an estate of L. 100, to begin at the expiration of 40 years, interest as above?

SECT. V. SERIES.

§ 88. Besides arithmetical and geometrical progression, already considered, there are many other kinds of series, the sums of which may be investigated by algebra. Our limits will only permit us to lay down the methods of computation in a few of the most useful cases, referring for the demonstrations to Dodson's Mathematical Repository, and other authors who treat of this subject at large.

Definition. If the arithmetical series 1, 2, 3, &c. of natural numbers be added, the sums 1, 3, 6, &c. are called TRIANGULAR NUMBERS.

If the series 1, 3, 6, &c. of triangular numbers be added, the sums 1, 4, 10, are called PYRAMIDAL NUMBERS.

If the series of pyramidal numbers be added in like manner, another series is obtained, and so on without limitation. These series are called FIGURATE NUMBERS.

§ 89. Prop. I. The sum of n terms of the series of triangular numbers $= \frac{n}{1} \times \frac{n+1}{2} \times \frac{n+2}{3}$

Prop. II. The sum of n terms of the series of pyramidal numbers $= \frac{n}{1} \times \frac{n+1}{2} \times \frac{n+2}{3} \times \frac{n+3}{4}$

The sum of any series of figurate numbers is determined by a like *formula*, the law of continuation being obvious.

§ 90. Prop. III. The sum of the series of square numbers 1, 4, 9, &c. continued to n terms $= \frac{n \times n+1 \times 2n+1}{6} = \frac{n^3}{3} + \frac{n^2}{2} + \frac{n}{6}$

§ 91. Prop. IV. If l represent the length and b the breadth of the smallest of a series of rectangles, whose sides differ by unity,

the sum $= \frac{2l+n-1 \times 2b+n-1 + n+1 \times n-1}{3} \times \frac{n}{4}$.

In a pile of cannon-shot, the several tires form a series of this kind: if the pile be complete, $b=1$. The rule for computing the number of shot contained in the above formula may be expressed in words as follows:

To twice the length, and also to twice the breadth of the uppermost tire, add the number of tires less one, and multiply these sums together; then multiply the number of tires less one by the number increased by one, and add one third of this product to the former; then multiply this sum by the number of tires, and divide the product by 4, which quotes the number of shot required.

§ 92. Prop. V. The sum of n terms of the series of cubic numbers 1, 8, 27, &c. $= \frac{n^4}{4} + \frac{n^3}{2} + \frac{n^2}{4}$, or equal to the square of the sum of the roots.

§ 93. Prop. VI. COMBINATION considers the varieties which may take place in selecting a lesser number of articles from a greater.

Let the whole number of articles be n ,

The combinations of 2 $= n \times \frac{n-1}{2}$,

The combinations of 3 $= n \times \frac{n-1}{2} \times \frac{n-2}{3}$,

and the law of continuation is obvious.

Ex. How many ways may a party of 3 soldiers be drawn out from a company of 50?

Anf. $50 \times \frac{49}{2} \times \frac{48}{3} = 19600$.

§ 94. Problem VII. ELECTION considers the varieties of one or more articles, not restricted to any particular number that may be chosen from a given quantity. If n represent the whole number of articles, the number of elections $= 2^n - 1$.

Ex. How many quantities is it possible to weigh at one operation with 5 weights, without using any of them as back-weights?

Anf. As we may put any single weight in the scale, or any two weights, or more, or all, the whole varieties are equal to the elections in 5. that is, to $2^5 - 1$ or 31.

§ 95. Prop. VIII. PERMUTATION considers the varieties which may take place in the order of things.

If the articles be all different, the permutations $= 1 \times 2 \times 3$, &c. continued to n .

Ex. How many ways may the 6 vowels be arranged?

Anf. $1 \times 2 \times 3 \times 4 \times 5 \times 6 = 720$ ways.

§ 96. If there be several articles of one or more kinds alike, let a represent the number of articles of the first kind, b the number of the second kind, and so on. The permutations are, $1 \times 2 \times 3 \times 4$, &c. to n

2×3 , &c. to $a \times 2 \times 3$, &c. to b , &c.

Ex. How many ways may the letters *abbcccd* be written?

Anf. $\frac{1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7}{2 \times 2 \times 3} = 420$.

§ 97. Prop. IX. Let the sum of the series $\frac{1}{R} + \frac{2}{R^2} + \frac{3}{R^3}$, continued to n terms, be required.

We

We shall give the investigation of this and the following proposition as a specimen of this branch of algebra, and on account of their use in the computation of annuities on lives.

If we multiply this series indefinitely continued by $\overline{R-1}^2$, or R^2-2R+1 , the product is R ; therefore the amount of the indefinite series is $\frac{R}{R-1}$, and the sum of n terms may be found by subtracting the terms after the n th from that amount. Now, the terms after the n th are $\frac{n+1}{R^{n+1}} + \frac{n+2}{R^{n+2}}$, &c. which may be divided into the two following serieses:

$$\text{First, } \frac{n}{R^n} \times \frac{1}{R} + \frac{1}{R^2} + \frac{1}{R^3}, \&c. = \frac{n}{R^n} \times \frac{1}{R-1} \text{ by } \S 78.$$

$$\text{Second, } \frac{1}{R^n} \times \frac{1}{R} + \frac{2}{R^2} + \frac{3}{R^3}, \&c. = \frac{1}{R^n} \times \frac{R}{R-1}^2$$

Now, if we write a for $\frac{1}{R^n}$, and r for $R-1$, and subtract the sum of these two serieses from the amount of the proposed series indefinitely continued, the remainder will be found $= \frac{1-a}{r^2} \times R - \frac{na}{r}$

§ 98. Prop. X. Let the sum of the series $\frac{n-1}{nR} + \frac{n-2}{nR^2} + \frac{n-3}{nR^3}$, &c. be required.

This series is equal to the difference of the two following:

$$\text{First, } \frac{n}{nR} + \frac{n}{nR^2} + \frac{n}{nR^3}, \&c. = \frac{1}{R} + \frac{1}{R^2} + \frac{1}{R^3} = \frac{1-a}{r}, \text{ by } \S 78.$$

$$\text{Second, } \frac{1}{nR} + \frac{2}{nR^2}, \&c. = \frac{1}{n} \times \frac{1}{R} + \frac{2}{R^2}, \&c. = \frac{1}{n} \times \frac{1-a}{r} \times R - \frac{a}{r},$$

by § 96.

The difference of these series is $\frac{1-a}{r} - \frac{R}{n} \times \frac{1-a}{r} + \frac{a}{r}$, which reduced, becomes $\frac{n+a-1 \times r+a-1}{nr^2}$

Qu. 1. How many shot in a triangular pyramid whose side is 25?

2. How many in a square pile whose side is 25?

3. How many in a complete oblong pile whose top-row contains 12?

4. How many in a broken pile of 12 tire, the uppermost tire 18 by 12?

5. What is the sum of the 10 first cube numbers?

6. How many affizes is it possible to hold at Oxford, each before two of the twelve judges, so that the same two judges (all of them being supposed to continue in office without change) may never hold them together?

7. If the colonel of a regiment invite 6 of his 30 officers each day at dinner, how long may it be before he invite the same company?

8. How many varieties in the stops of an organ that has 8 sets of pipes?

9. In how many different orders may a party of 12 men be drawn up?

10. In how many different orders may a gardener plant a row of trees consisting of 5 oaks, 4 ash, and 3 elms?

11. How many signals may be given by means of 4 different flags; for instance, a white, a yellow, a blue, and a red one, hoisted on the 3 topmasts and the boltsprit, using one or more at a time, so as to vary the signals as much as possible, but only one of a kind?

12. How many signals may be given, if there be 4 flags of each kind, so that a red one, or any other kind, may be hoisted on each mast, in order to give a greater variety of signals?

The two last questions do not fall immediately under any of the cases we have considered, but they may be solved on like principles, and are inserted to try the learner's invention.

C H A P. VII.

DOCTRINE OF CHANCES.

§ 99. **T**HE probability of future events is sometimes inferred from the nature of the case, and sometimes from experience. By the former we judge it equally probable, that, when a die is thrown up, it shall present any of its six faces, and therefore there is one chance in six that it shall present an ace. By the latter, if it appear, from an examination of the bills of mortality, that one third of the inhabitants of a city die under ten years of age, we conclude, that there are two chances in three that a newborn infant there shall attain the age of ten. And, although events may be regulated by determined and invariable causes, yet, if these causes be entirely unknown to us, our conjectures of their probability must be the same as if the events were precarious. Thus, the chance of success in a lottery is the same, whether the prizes be drawn in the common way, or affixed to certain numbers by the directors, providing they conceal the fortunate numbers, and dispose of the tickets impartially. But we must be careful, before we pass judgment on the probability of an event, that every circumstance which could come to our knowledge be duly attended to. It would be wrong, for instance, to conclude, because there are 24 letters in the alphabet, that therefore there was one chance in 24 of opening a book in a leaf which begins with *a*; for some letters are more frequent in our language than others. And, before

before we draw conclusions from bills of mortality, we must be well informed that the climate and manners of the people in the place where the bill was kept, be the same as where we mean to apply it to.

§ 100. In calculations of chances, certainty is represented by 1, and any degree of probability by a vulgar fraction. The number of possible cases is assumed for the denominator of the fraction, and the number of cases wherein the proposed event succeeds for the numerator. Thus, the chance that a guinea being thrown up shall present the king's head is $\frac{1}{2}$; the chance that a die shall present an ace is $\frac{1}{6}$. If 3 white balls and 5 black ones be put in a box, the chance that a person blindfolded shall draw a white ball is $\frac{3}{8}$. If it be certain, that one of several proposed events shall happen, the sum of the chances for these events is 1; therefore, if the chances for all but one be given, the chance for that one may be found.

§ 101. The money which a person may reasonably wager on any probable event, is determined by multiplying the prize to be gained, in case of success, by the chance of succeeding. Thus, one may stake L. 1 on the cast of a die, upon condition of receiving L. 6 if it present an ace; and the reason is obvious; for, on a number of trials, it may be presumed one in six will be successful; and therefore all the money staked may be expected back in prizes. The sum that ought to be staked is called the value of the expectation.

§ 102. Problem I. Given the chances for two independent events: Sought the chances that both shall take place.

Ex. If five white balls and seven black ones be put in one box, and one white ball and eleven black ones in another, what is the chance that a person blindfolded shall draw a white ball from both?

If balls be successively drawn from the first box, and returned, it may be expected to obtain a white one 5 times in 12 trials, and, if we succeed, there are still eleven chances of failing, and only one of obtaining a white ball from the second box; therefore the chance of succeeding in both trials is only $\frac{1}{12}$ of the chance in the first trial, that is, $\frac{5}{12} \times \frac{1}{12}$, or $\frac{5}{144}$.

In general, if we multiply the fractions which represent the separate chances, the product gives the chance of succeeding in both. The same rule applies to three, or any greater number of events.

§ 103. Prob. II. Given the chances for and against an event. Required the probability of succeeding any number of times in a proposed number of trials?

Let a represent the chances for an event, b the chances against it. The probability of its succeeding at the first trial is $\frac{a}{a+b}$, that
of

of its succeeding twice successively, $\frac{a^2}{a+b^2}$; that of its succeeding n times, $\frac{a^n}{a+b^n}$; that of its failing every time, $\frac{b^n}{a+b^n}$; and that of its succeeding once at least in n trials, $\frac{a+b^n-b^n}{a+b^n}$. To find the probability of succeeding once, and no oftener, in 3 trials, multiply $\frac{a}{a+b}$, the probability of succeeding at the first trial, by $\frac{b^2}{a+b^2}$, the probability of failing at the two next, and the product $\frac{ab^2}{a+b^3}$ gives the probability that the first trial shall be the only successful one; but as there is an equal probability that the second or third trials only shall be successful, the probability of succeeding once in three trials only is $\frac{3ab^2}{a+b^3}$. In general, if the binomial $a+b$ be raised to the power of n , the number of trials, the successive terms represent the chances for succeeding every time, every time but once, &c. and the last term, the chances for failing every time. These numbers, placed as numerators above the denominator $a+b^n$, give the probabilities required.

§ 104. Prob. III. Required the number of trials which give an equal chance of succeeding once or oftener?

Ex. If a lottery have one prize to 19 blanks, how many tickets must a person possess to have an equal chance for one or more prizes?

Let x be the number of tickets required, a the proportion of prizes, and b the proportion of blanks; then the chance for one or more prizes is $\frac{a+b^x-b^x}{a+b^x}$ by § 121; and the chance for none is $\frac{b^x}{a+b^x}$ by § 120; and, because these chances are equal, $\frac{a+b^x-b^x}{a+b^x} = \frac{b^x}{a+b^x}$, or $a+b^x-b^x=b^x$, or $a+b^x=2b^x$; whence $\log. a+b^x = \log. 2 + \log. b^x$, and $x = \log. 2 \div \log. a+b - \log. b$.

$$\begin{array}{rcl} \text{Now, } \log. a+b & (20) & = 1.3010300 \\ \log. b & (19) & = 1.2787536 \end{array}$$

$$\begin{array}{rcl} \text{Difference} & = & .0222764 \\ & & .3010300 = \log. 2. \\ & & \text{Answer } 13.5 \text{ Tickets.} \end{array}$$

§ 105. Prob. IV. Required the chances of obtaining any assigned throw with n dice?

Ex. What are the chances of throwing a six, a five, a four, a three, with four dice?

As each of the dice has 6 faces, the whole number of possible throws that can be cast up by 4 dice is 6^4 , or 1296.

If

If the dice were of different colours, and it were required that one in particular should cast up a fix, another a five, and so on, the chance would be $\frac{1}{216}$; but, as any of the dice will answer for the fix, the five, &c. the required throw may be obtained as many ways as there are permutations in 4 articles: Therefore, by § 95 it may be obtained $2 \times 3 \times 4$, or 24 ways, and the chance of hitting it is $\frac{24}{216}$, or $\frac{1}{9}$.

In general, the chance of hitting any throw that consists entirely of different faces with n dice, is $\frac{2 \times 3 \times 4, \&c.}{6^n}$ the numerator being continued to n ; but, if the same face occur twice, or oftener, the denominator must be estimated as directed § 96. Thus, if the chance of throwing 3 fixes, 2 fives, and a four, with 6 dice be required, the number of permutations is $4 \times 5 \times 6 \div 2 = 60$, and the chance is $\frac{60}{216} = \frac{5}{18}$.

§ 106. Prob. V. Required the chance of throwing any proposed number with a given number of dice?

Ex. What are the chances of throwing 15 with 3 dice?

This number may be thrown 3 ways:

First 6, 5, 4, which admits of 6 permutations.

Second 6, 6, 3, which admits 3 permutations.

Third 5, 5, 5, which has only one arrangement.

In all, 10 permutations.

Therefore the proposed number may be thrown by 10 different casts; and, as there are altogether 216 casts with three dice, the chance required is $\frac{10}{216}$.

In general, we may find how many ways the proposed number can be made up, and how many permutations each of these admits, and divide the sum of these permutations by the n th power of 6.

§ 107. As it would be often laborious, if not impracticable, to compute the chances at dice by means of the permutations, Mr De Moivre has investigated the following rule:

Let n represent the number of dice; f , the number of faces on each die, in common dice $= 6$; p , the points to be thrown; make $a = p + 1 - n$, $b = a - f$, $c = b - f$, and so on till the number be exhausted. Then the chances required are represented by

$$\begin{aligned}
 & + \frac{a}{1} \times \frac{a+1}{2} \times \frac{a+2}{3}, \&c. \text{ Number of factors } n-1. \\
 & - \frac{b}{1} \times \frac{b+1}{2} \times \frac{b+2}{3}, \&c. \times \frac{n}{1} \\
 & + \frac{c}{1} \times \frac{c+1}{2} \times \frac{c+2}{3}, \&c. \times \frac{n}{1} \times \frac{n-1}{2} \\
 & - \frac{d}{1} \times \frac{d+1}{2} \times \frac{d+2}{3}, \&c. \times \frac{n}{1} \times \frac{n-1}{2} \times \frac{n-2}{3} \\
 & + \&c.
 \end{aligned}$$

Ex. What are the chances of throwing 20 points with 6 dice ?

$$+ \frac{16}{1} \times \frac{17}{2} \times \frac{18}{3} \times \frac{19}{4} = + 3876$$

$$- \frac{10}{1} \times \frac{11}{2} \times \frac{12}{3} \times \frac{13}{4} \times \frac{5}{1} = - 3575$$

$$+ \frac{4}{1} \times \frac{5}{2} \times \frac{6}{3} \times \frac{7}{4} \times \frac{5}{1} \times \frac{4}{2} = + 350$$

Chances 651

which, prefixed to 6^s gives $\frac{651}{7776}$, the chance required.

Qu. 1. A quantity of white and black balls being mixed in the proportion of 3 to 2 ; required the chances of drawing a white ball any number of times in 6 trials ?

2. In a lottery where there are 9 blanks to a prize, required as in § 104. ?

3. Required the chances for casting 16 points with 4 dice ?

4. ——— for casting 12 points with 6 dice ?

C H A P. VIII.

ANNUITIES FOR LIVES.

§ 108. **T**HE value of annuities for lives depends on the interest of money, and on the probability of their duration.

If the number of inhabitants in a city or country be nearly equal for a course of years, and if the number of strangers who settle in it, or of natives who leave it, be inconsiderable in respect of the whole, or balance each other, it is easy to find the probabilities of life from an exact register of the deaths, in which the ages of the dead are distinguished.

For the whole number of births must be equal to the whole number of deaths. If the infants who die in the first year be subtracted, both the remainders will be equal, or the number who live to the end of the first year will be equal to the number of persons dying annually above the age of one. For the same reason, the number of persons who live to ten, or any other age, is equal to the number of annual deaths above that age. Therefore, if we add the numbers in the bills of mortality, from any age downwards, the sum is the number of those born in one year who attain that age. And thus a table may be composed for exhibiting the rate of mortality at every age, and consequently the probability of living to any proposed term.

It is convenient to reduce these tables to the proportion of 1000 persons,

persons, and to mark both the number alive at the end of each year, and the number that die during the year. We have annexed two tables; the first composed by Dr Halley, from the bills of mortality kept at Brellaw in Silesia, which correspond nearly with those of some manufacturing towns in England; the other, formed from the London bills for 10 years, by Mr Simpson, with a correction which we shall explain afterwards.

The probability that a person whose age is given shall reach any age proposed, is expressed by a fraction, whose numerator is the number in life at the age proposed, and whose denominator is the number in life at the present age. Thus, the chance that a person now 40 shall live to 60 is $\frac{242}{347}$ by Dr Halley's bills, and $\frac{110}{194}$ by the London bills; and the chance of his dying before he reach that age is $\frac{103}{347}$ by the former table, and $\frac{84}{194}$ by the latter.

§ 109. These tables may be applied for computing the whole number of inhabitants in the place. If all the births happened on the first day of the year, and all the deaths in the last, it is obvious, since the table of probabilities consists of the number of inhabitants alive at birth, and at the end of the first, second, and following years, that the sum would be equal to the whole number of inhabitants. On the other hand, if all the births happened on the last day of the year, and the deaths on the first day, the number of inhabitants would be less than on the former supposition by the whole number born in one year. Now, the truth lies exactly in the middle between these two suppositions; for the births and deaths neither happen all at the beginning, nor all at the end of the year, but are equally diffused through it. Therefore, the number of inhabitants is computed by subtracting half the sum of the annual births from the sum of the table of probabilities.

§ 110. The expectation of life is the number of years which mankind, taken one with another, enjoy, either from birth or any age proposed; the excess in the life of those who survive it being exactly equal to the deficiency in the life of those who do not reach it.

To find the expectation of life at any age, divide the number of persons alive at that age and upwards, or the sum of the numbers in the table of probabilities from that age and upwards, by the number alive at that age, and from the quotient subtract half a year. Thus, the sum of the living, in Dr Halley's table, at 9 and upwards, is 27708. This is the number of years that would be enjoyed by 670 persons alive at 9, if they all completed the year in which they died; and, being divided by 670, quotes 41.35 years to each; but, because as many die in the beginning as at the end of the year, we subtract a half year, which gives 40.85, the expectation of life for a person whose age is 9: And this would be the value of an annuity for life, if no allowance were made for the interest of money.

This term is not always the same as that which a person has an equal chance of attaining. Thus, one half of the children born in London die under three; and therefore a new born child has scarcely an equal chance of attaining the age of three; but, if he escape the dangers of infancy, he has so good a chance of reaching a considerable age, that his expectation of life is upwards of 20. For, if the number of years which all the children reach were equally divided among them, so many would fall to the share of each.

§ 111. We are next to consider the method of applying bills of mortality, to the purpose of these computations, in places which are increasing or diminishing, or which are affected by the confluence of strangers, or migration of the natives.

Great cities seldom support themselves. The burials generally exceed the births; and they would soon decay, if they were not constantly supplied with recruits from the country. The age at which these recruits generally settle, may be inferred from the bills of mortality. In London, the burials are about one fourth more than the births; and the bills of mortality, from the age of ten to twenty, correspond nearly with others; but, after twenty, the proportion of burials, compared with those under twenty, is twice as great as in other places. This is occasioned by the number of strangers who resort to the capital about that age, whose deaths, as well as the deaths of the natives, are inserted in the bills; and, although no register of births were kept, we might infer from that sudden increase in the number of burials above twenty, that the population of London was supported by strangers who resorted to it about that age. In order to reduce the London bills to an useful form, we must divide the deaths above twenty into two parts, distinguishing those of the natives and settlers; and the bills of burials under twenty, (which includes few settlers), being completed by such a proportion of the burials above twenty as arise from the natives only, may be safely used for forming tables of probabilities, as directed § 108.

Without this correction, the number of inhabitants, probabilities of life, and consequently the expectation of life, would be given too high in all ages under 20. The true probabilities and expectations may be calculated from the corrected tables, and the true number of inhabitants is found, by multiplying the number of births by the expectation at birth, and the number of settlers by the expectation at the age of settlement.

It will readily occur, that the direction for correcting the bills of mortality, by subtracting a proportion from all the burials above 20, is founded on the supposition, that all the settlers resort to the city at that age. As this is not strictly true, the correction should not be made at once, but introduced at different ages, in proportion to the numbers that settle at each age. The bills, however, when
corrected

corrected as above, come pretty near the truth; and this subject does not admit of perfect accuracy.

§ 112. The country is so favourable to population, that though many of the natives remove to cities or foreign countries, the number of inhabitants often remains undiminished. In this case, the bills of mortality give the probabilities of life and number of inhabitants too low. In order to calculate the true probabilities, the bills must be corrected, by adding the deaths of the emigrants, supposing them to waste at the same rate as the natives. To calculate the number of inhabitants, we multiply the number of births by the expectation of life at birth, computed from the true probabilities; and subtract from the product the number of emigrants multiplied by their expectation of life at the time of their removal.

§ 113. In some countries, there is a rapid increase of the number of inhabitants, from the stock of natives. In this case, the bills will also give the probabilities of life too low; for the first effect of the increase is, to enlarge the number of children beyond the due proportion to adults, and consequently enlarge the number of burials in the first stage of life.

Some cities, on the contrary, increase rapidly, by reason of a resort of strangers, though the number be not maintained from the original stock. In this case, the bills must give the probabilities of life in its first stages much too high, and much too low about that period of life that the strangers in general settle, and somewhat, but not so much, too low, in the later stages of life, providing the place has been in that situation for a course of years.

On the same principles, we might trace the effects of a decrease in the number of inhabitants, whether occasioned by a defect in the births, by extraordinary mortality, by migrations, or by a combination of these causes: But we have sufficiently opened this subject, and shall leave the rest to the student's own investigation.

§ 114. It appears, from the comparison of tables, that the duration of life is greatest in the country, shorter in towns, and still shorter in great cities. This may be accounted for from the circumstances of great numbers being crowded in a small compass, by which the air is rendered unwholesome, and infectious diseases more prevalent; the sedentary employments, and want of exercise in the open air; and especially from the luxury and excess which prevails in cities. The difference is greatest in infancy, and very considerable in the first years of manhood, and becomes gradually less in the more advanced stages of life. In old age, the waste of life is as slow, or perhaps slower, in cities than in other places; the reason of which probably is, that all persons of weak constitutions are cut off in earlier years, and none but those who possess an uncommon share of natural vigour ever reach that period. It

is also observed, that the lives of women, especially after the middle period of life, waste more slowly than those of men.

§ 115. In order to facilitate computations of annuities on lives, Mr De Moivre assumed the age of 86 as the utmost probable extent of life, and supposed that equal numbers died at all ages; so that, of 86 persons born at the same time, it might be expected one would die each year, till the whole were extinct. The difference between any proposed age and 86 is called *the complement of life*.

§ 116. PROB. I. To determine the value of an annuity of L. 1, to continue during the life of a person whose age is given, allowing compound interest at a given rate.

It was shown, § 83. that if R be placed for the amount of L. 1, with interest, the present value of L. 1, payable at the end of one, two, or more years, is expressed by $\frac{1}{R}$, $\frac{1}{R^2}$, &c.; but as the right to each annual payment depends on the continuance of the life, we must multiply each of these terms by the probability that the annuitant shall be alive at the end of the first, second, and following years. These products give the present values of the successive annual payments subject to the risk of the annuitant's death; and, if we add the values of all the payments which may possibly be received to the extremity of old age, the sum is the value of the annuity required.

If n represents the number of persons alive at any age, and a , b , &c. the numbers that die in the first, second, and following years thereafter, then $\frac{n-a}{n}$, $\frac{n-b}{n}$, &c. will represent the chances that a person of that age shall live to the end of the first, second, and following years; and if these chances be multiplied by the present values of the annual payments, the value of the annuity is represented by the product $\frac{n-a}{nR} + \frac{n-b}{nR^2}$, &c. continued till $n-x=0$, or to the utmost extremity of life.

§ 117. If we adopt Mr De Moivre's hypothesis, n is equal to the complement of life, and a , b , &c. are each equal to 1, and the series becomes $\frac{n-1}{nR} + \frac{n-2}{nR^2}$, &c. the sum of which series, by

§ 98. is $\frac{n-1+a \times r+a-1}{nr}$, where n represents the complement of life, a the present value of L. 1 at the end of the same, and r the rate of interest.

This theorem, expressed in words, gives the following rule:

Find the present value of L. 1 due at the end of the complement of life, to which add the complement of life less one; multiply this sum by

by the rate of interest, and to the product, less one, add the present value of L. 1. The sum is the dividend.

Multiply the square of the rate of interest by the complement of life; the product is the divisor.

Divide these terms, and the quotient is the value required.

Ex. What is the value of an annuity of L. 1, depending on the life of a person whose age is 54, allowing interest at 4 per cent.?

For the dividend.

Extent of life	86	Present value of L. 1. =	0.285058
Age	54	Comp. of life less 1 =	31.

Comp. of life	32		31.285058
		Rate of interest =	.04

For the divisor.

Rate	.04		.251402
	.04		.285058

	.0016		.0512).536460
Comp. of life	32	Value of the annuity	10.478

.0512

The values of annuities on lives, calculated by this rule, are nearly equal to those calculated from Dr Halley's table, but rather less. The values from the London bills are considerably less, and those from the bills of country places, favourable to human life, are considerably greater. Therefore the rule gives a medium value; and may be preferable, for general use, to calculations formed on the bills of any particular place. The value of an annuity, according to the probability of life at any particular place, may be found with sufficient exactness by the following proportion:

As half the complement of life is to the expectation of life inferred from the tables of the place, so is the value by the hypothesis to the true value.

The value of an annuity of L. 1, for a given life, is called the value of the life. In a like sense, we speak of the value of two or more lives, either joint or separate.

§ 118. PROB. II. To determine the value of an annuity of L. 1, to continue during the joint lives of two persons, and cease when either of them dies, allowing compound interest at a given rate.

Let n represent the number of persons in life at the age of the elder, and a , b , and c , the numbers that die in the first, second, and following years thereafter; and let n , a , b , c , represent the same with respect to the younger; then the chance that both persons shall

live to the end of the first year is $\frac{n-a}{n} \times \frac{n-a}{n}$; and the chance

that

that both shall live to the end of the second year is $\frac{n-b}{n} \times \frac{n-b}{n}$:

Therefore the value of the annuity is $\frac{n-a}{n} \times \frac{n-a}{nr} + \frac{n-b}{n} \times \frac{n-b}{nr^2}$, &c. The sum of this series, on Mr De Moivre's hypothesis, is $p - \frac{p+1}{n} \times \frac{n-n-2p-1}{n} \times \frac{c}{n} + 2p$, where p represents the perpetuity, and c an annuity certain for n years.

§ 119. PROB. III. To determine the value of an annuity of L. 1, to continue during the longest of two lives.

Multiply the chances that the lives shall fail the first year into each other; the product is the chance that both shall fail; and this product being subtracted from unity, the remainder is the chance that one of them at least shall continue to the end of the first year. In like manner, the chance that one or both shall survive the second and following years, may be found; and the series formed by multiplying these chances into the present values of the successive annual payments, will give the value of the annuity required.

But if tables of the values for single and joint lives be already formed, the problem may be solved with more ease; for if I be intitled to receive L. 1 yearly till A and B be both dead, my advantage is the same as if I were intitled to receive L. 1 from A during his life, and L. 1 from B during his life, but were bound to pay L. 1 to C so long as A and B were both alive.

Therefore, from the sum of the values of the single lives subtract the value of the joint lives; and the remainder is the value of an annuity on the longest of the two lives.

§ 120. PROB. IV. To determine the value of an annuity of L. 1 on three joint lives.

This question might be solved by investigating the sum of a series on principles similar to the former; but the solution becomes intricate. The following method, by the help of tables of single and joint lives, is sufficiently exact for practice.

Let the lives be A, B, and C, whereof C is the youngest; take the value of the joint lives A and B from the tables, and find the age of a person, D, whose life is of the same value; then find the value of the joint lives of C and D, which is the value required.

§ 121. PROB. V. To determine the present value of a reversionary annuity to which A will be intitled, if he survive B, during the remainder of his life.

A has the same advantage from this expectation, as if he received the annuity at present for life, but were under an obligation to pay a like annuity during the joint lives of B and himself. Therefore,

fore, from the value of A's life subtract the joint value of the lives of A and B; the remainder is the value of the expectation.

Ex. What is the value of an annuity of L. 20, to which a person, whose age is 25, will become intitled after the death of another whose age is 35, reckoning compound interest at 4 per cent. and the waste of life, according to Mr De Moivre's hypothesis.

From the value of the life in expectation aged 25	15.318
Subtract the value of the joint lives aged 25 and 35	11.095

4.223

20

Which, multiplied by the annuity,

Gives the present value

84.46

Therefore, the price which a person should pay to procure for his widow an annuity of L. 20, reckoning the ages, probabilities, and interest, as above, is L. 84:9:2; and, if a society of married persons pay each that sum into a common fund, the same, with proper improvement, will be sufficient to afford an annuity of L. 20 to their widows, providing the mean age of the husbands be not above 35, nor that of the wives under 25, at the time of payment; but this fund will not afford any annuities to widows left from second marriages. The value of a reversionary annuity, after two or more joint lives, is computed by subtracting the value of all the lives from the value of the life in expectation.

§ 122. PROB. VI. To determine how much a married man should pay annually during the continuance of his marriage, or during life, in order to purchase an annuity for his widow.

The solution of the former problem gives the sum of money which it would be necessary to pay down instantly for that purpose. It remains to show what sum paid annually would be equivalent to that single payment.

If the first payment be not made till the end of a year, we must find an annuity during the joint lives, whose present value would be equal to the above mentioned sum; and, for this purpose, we divide the value in a single payment by the value of the joint lives. But if the first payment be instantly made, we must divide by the value of the joint lives increased by unity: For an annuity, when the first payment is immediately laid down, is more valuable by a full year's purchase, than when the payment is only made at the end of the year.

In the example given for the last question, the value in a single payment was L. 84.46; and this, divided by 12.095, the value of the joint lives, increased by unity, quotes L. 6.98, the amount of the annual payment during marriage.

§ 123. If a society be formed on this plan, and the money paid into a common fund, there will be few annuitants for several years,

years, and the annual contributions will be much greater than the annual demands. The overplus must be improved at compound interest. After some time, the number of annuitants will increase, and the annual demands will exceed the annual contributions; then part of the interest on the capital, which was accumulated during the first years, must be taken to pay the difference. But it will not be for many years, nor till the greatest possible number of annuitants have come on, that the whole interest will be needed for that purpose. After this, if the number of the society be kept always up, by admitting new members in place of those that die, the capital will continue stationary; the whole interest, as well as the annual contributions, will be required to pay the annuities; and they will be sufficient. But if the society be permitted to decay, as the members die; the annual demands will soon exceed the contributions and interest; and the capital must be diminished to make good the deficiency. After the members are all dead, and the contributions of consequence ceased, there will still be a considerable number of annuitants, and the capital will diminish quickly. At last the number of surviving widows will be few when the capital becomes small, and all the widows will become extinct, nearly at the same time that the capital is exhausted.

§ 124. If the members of such a society find security to continue the payments during life, the annual payment is found by dividing the single payment by the value of the husband's life, increased by unity, when the first payment is made instantly; and, in the foregoing example, would come to L. 5.63. This payment, continued during the lives of the husbands, will be sufficient for providing annuities to their present wives; but will not afford any to the widows of subsequent marriages.

If the whole body of men, in any profession, be associated in such a scheme, as the ministers of the church of Scotland are, the payment of L. 6.98 may be diminished, or the annuity increased, in the proportion that the number of unmarried members bears to the whole society.

If a fine be paid at admission to the society, the same must be subtracted from the value, in a single payment, and the remainder only divided by the value of the joint lives. In the foregoing example, if L. 36.08 be paid at admission, besides paying the first annual contribution by advance, then an annual payment of L. 4 during marriage will be sufficient.

§ 125. PROB. VII. To determine how much a married man should give in a single payment, or in annual payments, in order to purchase an annuity for his widow, which is not to take place, unless the marriage continue during a given term (suppose of ten years).

The value, in a single payment, to be made 10 years hence, is found

found as in last question; but a smaller sum at present will be sufficient; because, if a society be established on this scheme, many of the marriages will be dissolved before the expiration of ten years, and all the payments on these is so much clear gain; and also, because the payment made at present may be improved at compound interest during these 10 years: therefore we must calculate the value in a single payment for lives 10 years older than the proposed ones, and multiply the same by the chance that both parties shall be alive at the end of 10 years; and also by the present value of L. 1, payable 10 years hence. The last product is the present value in a single payment; and, if we divide the same by the value of the joint lives increased by unity, the quotient is the value in annual payments, during the continuance of the marriage; or, if we divide it by the value of the husband's age increased by unity, the quotient is the value in annual payments, during the husband's life.

Let us take the example used for illustrating the last question. The husband will be 45 years old, and the wife 35, at the end of 10 years; and therefore,

From the value of the wife's life,	13.979
Subtract the value of the joint lives	10.622

3.357

Chance of the husband's living 10 years	$\frac{197}{490}$
Chance of the wife's living 10 years	$\frac{490}{587}$
Chance that both shall be alive	$\frac{197}{587}$

Present value of L. 1 at the end of 10 years .67556

Then $3.357 \times .67556 \times \frac{197}{587} = 1.587$, the number of purchase that should be paid for the annuity.

Some societies of this kind increase the annuities to widows, if the marriage continue a certain number of years. In order to find the necessary payments, we must compute the value of the lowest annuity, as directed in the last question, and of the advanced annuity as directed in this.

§ 126. PROB. VIII. To determine the value of an estate of L. 1 per annum, in perpetuity, after the death of the present possessor.

The full value of the estate is $\frac{1}{r}$ by § 80. If we subtract from this the value of the given life, the remainder is the value of the reversion.

The value of a reversion, after two or more lives, or of a reversion depending on any contingency, is found, by subtracting the value of all the other interests from the value of the perpetuity. If P represent the perpetuity, V the other interests, and R the reversion; then $R = P - V$.

§ 127. PROB. IX. To determine the present value of an estate
B b
for

for a limited number of years, or for any term less than a perpetuity, to commence at the expiration of one or more given lives.

The value of any estate, when the possession opens, may be computed by the foregoing problems. The present value is less, because the possession does not commence till a future and uncertain term: And this circumstance will diminish the value of a limited estate in the same proportion as it diminishes the value of the perpetuity: Therefore, if W represent the value of the limited estate when it commences, P , V , and R , as before:

$$P : P - V(R) :: W : \frac{P - V}{P} \times W \text{ or } \frac{RW}{P}$$

In words: Multiply the value of the limited estate, when it begins to be possessed, by the value of a reversion for ever after the prior estate (or by the difference between a perpetuity and the prior estate), and divide the product by the value of a perpetual estate in present possession.

§ 128. PROB. X. To determine the value of an annuity of $L. 1$, on a given life, payable twice a-year, in equal portions.

The value of an annuity is increased by receiving the payments twice a-year, for two reasons: First, the annuitant will receive a half year's payment more if he should die in the last half year; and as there is an equal chance that this may happen, the value of this expectation, payable at his death, is $\frac{1}{4}$, and the present

value is $\frac{P - V}{4P}$. Secondly, he has always the use of the half year's pension for half a year, and may improve it at interest; whereby the whole advantage arising from the annuity, at the end of the year, will receive an increase equal to the interest of the annuity for a quarter of a year. And since the value of the whole annuity, if paid annually, is V , the value of this increase is $\frac{V}{4P}$; which, added to the value of the above mentioned expectation, gives the whole advantage $\frac{P}{4P}$ or $\frac{1}{4}$. Therefore, a pension payable twice a-year is worth a quarter of a year's purchase more than a like pension payable once a-year.

§ 129. PROB. XI. To determine the present value of a sum of money to be received at the expiration of a given life.

The value of a reversionary estate, computed as directed in Prob. VIII. is greater than that of a reversionary sum which yields the same interest; for, in the case of an estate, the person intitled to the reversion is supposed to draw the first year's rent at the term which follows the possessor's death; whereas, in the case of a sum of money which is payable at that term, the successor must lay it out to interest, and will not draw any rent till a year after: Therefore, the estate is more valuable than the sum by a year's purchase, when the possession opens, and by a like proportion at present.

present. If interest be computed at 4 per cent. a reversionary sum of L. 26 is equal to a reversionary estate of L. 1; for, if L. 1 be taken from the sum, instead of the first year's rent, and the remaining L. 25 laid up at interest, it will yield a rent of L. 1 for ever after; and, in general, a reversionary sum of $P+1$ is equal in value to a reversionary estate of L. 1: Therefore the present value of any sum S , after a life whose value is V , may be expressed by $\frac{P-V}{P+1} \times S$.

Ex. Let the sum proposed be L. 100, the age 40, and the rate of interest 4 per cent.

P , or value of an estate of L. 1, at 4 per cent.	25.000
V , or value of an annuity on a life of 40	13.196

Which, divided by $P+1$	=	26)11.804
	quotes	.454
	Sum	100

Present value L. 45 : 8s. = 45.4

§ 130. PROB. XII. To determine the value of a life-annuity which runs from day to day, so that, in whatever part of the year the annuitant dies, his heirs are intitled to draw in proportion to the time elapsed since last payment.

As it is equally probable that the annuitant may die in any part of the year, his heirs may reasonably compound their expectation for a half year's annuity, payable at his death, for there is an equal chance that they may be intitled to less or more. The present value of this expectation, by last problem, is $\frac{P-V}{2P+2}$; which, added to V , the value of the life, calculated by Prob. I. gives the full value of the annuity.

§ 131. PROB. XIII. To determine how much a person should give in annual payments, in order to intitle his heirs to receive a sum of money, suppose L. 100, at his death.

Find, by Prob. XI. the present value of a reversionary payment of L. 100, to take place at the expiration of the given life. This gives the sum which should be paid down at present to secure one's heirs in the sum proposed. Then divide this single payment by the value of the life increased by unity; the quotient is the annual payment which should purchase the same.

Thus, a person aged 40 may secure L. 100 to his heirs by a present payment of L. 45.4, as was shown in Prob. XI. If we divide this by 14.196, the value of a life of 40, increased by unity, the quotient 3.2, or L. 3 : 4 s. is the value, in annual payments, during life.

§ 132. PROB. XIV. To determine how much a person should give

give for a sum to be paid to his heirs, in case he die in one, two, or more years. Or, What should a person give for assuring his life for a given time?

The chance of his dying each year, multiplied by the present value of L. 1, payable at the end of that year, is the sum which the assurer should receive for the risk incurred that year. According to Mr De Moivre's hypothesis, the series $\frac{1}{nr} + \frac{1}{n-1.r^2} + \frac{1}{n-2.r^3}$ extended to as many terms as there are years, gives the value of the assurance.

Otherwise: Suppose a person aged 30 desires to assure his life for 10 years, the value of an assurance for the whole extent of life may be found by Problem XIII. and also the value of an assurance for what may remain of his life after 40, providing he reach that age; but a less sum, instantly paid, will be sufficient to purchase the assurance after 40; because the assurer has the advantage of the improvement of money for 10 years, and the chance of the person's death during these 10 years in his favour. Therefore, if we multiply the assurance for the whole extent of life after 40, by the chance that a person now 30 shall live to 40, and also by the present value of L. 1, due at the end of 10 years; the last product is the present value of an assurance for the remainder of a life now 30, after 10 years; and if this be subtracted from the full assurance of a life now 30, the remainder is the value of an assurance on that life for 10 years.

Let the sum assured be L. 100, and rate of interest 4 per cent. the assurance of L. 100 on a life of 40, by Problem XII. is L. 45.4. If we multiply this by $\frac{445}{1111}$, the chance that a person now 30 shall live to 40, and also by .67556, the present value of L. 1, at the end of 10 years, the last product 25.7 is the present value of the assurance after 40.

Now, the value of a full assurance on a life of 30 is L. 39.68

From which take the value of the remainder after 40 25.70

Value of the assurance of a life of 30 for 10 years 13.98

§ 133. PROB. XV. To determine the present value of an annuity to continue for a limited number of years, providing a given life last so long. Also, the value of an annuity to commence at the end of a given number of years, if a person, whose present age is given, be then alive, and continue to the end of his life.

It is obvious that the sum of the answers to these two questions is equal to the value of the life. The terms of the series given in § 115. exhibit the values of the successive annual payments during a given life; therefore the sum of the first y terms is the value of an annuity on a given life limited to y years, and the sum of the remaining terms is the value of an annuity on the remainder of the same life after y years.

The

The easiest method of solving these questions is the following :
 Let the given age be 40, and the term 20 years. The value of a life of 60, by Mr De Moivre's hypothesis, reckoning interest at 4 per cent. is 9.017. If we multiply this by $\frac{242}{117}$, the chance that a person now 40 shall live to 60, and also by .45639, the present value of L. 1, at the end of 20 years; the last product is the present value of the remainder of a life now 40, after 60.

Now, the full value of a life of 40 is	13.196
Value of the above mentioned remainder	2.238

Value of the first 20 years of the life	10.958
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§ 134. PROB. XVI. A person desires to pay a certain sum annually during the younger part of his life, in order to intitle him to a proposed annuity for his support in old age. Required the amount of the annual payment ?

Ex. A person aged 40 desires to secure himself in an annuity of L. 20, in case he live to 60, for the remainder of his life, and proposes to purchase the same, by annual payments, till he reach that age. How much should he pay, reckoning interest at 4 per cent. ?

The present value of an annuity of L. 20, for the remainder of a life whose present age is 40, after 20 years, is L. 44.76, by last problem. It remains to find what annual contribution for 20 years, subject to fail, in the mean time, by the person's death, is equal to that single payment. Now, the value of an annuity for that term, and subject to that contingency, is 10.958; and if we divide L. 44.76 by the same, the quotient L. 4.08 is the value in annual payments. In this solution, the first contribution is supposed to be paid at the end of the 41st year, and the first payment received at the end of the 61st year of the person's life. It is easy to make the necessary alterations, if the payments be made at the beginning of these years.

§ 135. PROB. XVII. A, the present possessor of an estate, has a right to name a successor, B, by his last will; but, after the death of B, the estate is to belong to C, and his heirs, for ever. Required the value of the reversion, or of C's interest therein ?

The value of the reversion, in this case, is less than that of a reversion after two given lives; for, if the lives be both assigned at present, they are wasting together; whereas, if the second life be appointed at the end of the first, A may die at an advanced age, and appoint for his successor a person not in existence at present, and who may be in the most favourable period of life when the succession opens to him.

If W represent the value of the successor's life when he attains possession, P and V as before; the present value of the successor's interest, commencing at A's death, is represented by $\frac{P-V}{P} \times W$:

Therefore

Therefore the value of the two successive lives is $V+W - \frac{VW}{P}$,
and the value of the reversion is $P-V-W + \frac{VW}{P}$.

Qu. 1. A person aged 40, who is married to a wife aged 35, desires to secure her in an annuity if she survives, and that the amount of the annuity may be L. 20 at all events, L. 25 if he live 12 years, and L. 30 if he live 20 years. Required what annual contribution during marriage he should pay for the same?

2. A person whose present age is 35, desires to secure for himself, if he should attain to old age, an annuity of L. 10, to commence at 60, and L. 5 more at 70, till his death; and to pay for the same a sum of money in hand, and L. 1 per annum, till he arrive at 50. How much should he pay in hand?

3. A person aged 50 has two daughters, aged 20 and 15, whom he desires to provide in reversionary annuities after his death, by annual payments during his life. How much should he pay to entitle them to L. 30 each during their joint lives, and L. 40 to the survivor?

4. A society for the benefit of widows admits members at or under 40, for an annual payment of L. 5, providing their wives be of the same age; but they exact a fine, at entry, if the wife be younger. What fine should a person pay whose wife is 25 years old?

5. A society of the same kind admits members above 40, but exacts a fine at entry, from those above that age, to compensate the disadvantage which arises from the same. What fine should a man of 55 pay at admission?

§ 136. As computations in compound interest and annuities are very tedious, tables are commonly used in business; of which the following are the most requisite.

TABLE

TABLE I. Amount of L. 1 Compound Interest.

Years.	3p.cent.	4p.cent.	5p.cent.	Years.	3p.cent.	4p.cent.	5 p.cent.
1	1.03000	1.04000	1.05000	26	2.15659	2.77247	3.55567
2	1.06090	1.08160	1.10250	27	2.22129	2.88337	3.73346
3	1.09273	1.12486	1.15762	28	2.28793	2.99870	3.92013
4	1.12551	1.16986	1.21551	29	2.35657	3.11865	4.11614
5	1.15927	1.21665	1.27628	30	2.42726	3.24340	4.32194
6	1.19405	1.26532	1.34010	31	2.50008	3.37313	4.53804
7	1.22987	1.31593	1.40710	32	2.57508	3.50806	4.76494
8	1.26677	1.36857	1.47746	33	2.65234	3.64838	5.00319
9	1.30477	1.42331	1.55133	34	2.73191	3.79432	5.25335
10	1.34392	1.48024	1.62895	35	2.81386	3.94609	5.51602
11	1.38423	1.53945	1.71034	36	2.89828	4.10393	5.79182
12	1.42576	1.60103	1.79586	37	2.98523	4.26809	6.08141
13	1.46853	1.66507	1.88565	38	3.07478	4.43881	6.38548
14	1.51259	1.73168	1.97993	39	3.16709	4.61637	6.70475
15	1.55797	1.80094	2.07893	40	3.26204	4.80102	7.03999
16	1.60471	1.87298	2.18287	41	3.35990	4.99306	7.39199
17	1.65285	1.94790	2.29202	42	3.46070	5.19278	7.76159
18	1.70243	2.02582	2.40662	43	3.56452	5.40050	8.14967
19	1.75351	2.10685	2.52695	44	3.67145	5.61652	8.55715
20	1.80611	2.19112	2.65330	45	3.78160	5.84118	8.98501
21	1.86029	2.27877	2.78596	46	3.89504	6.07482	9.43426
22	1.91610	2.36992	2.92526	47	4.01190	6.31782	9.90597
23	1.97359	2.46472	3.07152	48	4.13225	6.57053	10.40127
24	2.03279	2.56330	3.22510	49	4.25622	6.83335	10.92133
25	2.09378	2.66584	3.38635	50	4.38391	7.10668	11.46740

TABLE II. Present Value of L. 1 Compound Interest.

Years.	3p.cent.	4p.cent.	5p.cent.	Years.	3p.cent.	4p.cent.	5p.cent.
1	.970874	.961538	.952381	16	.463695	.360689	.281241
2	.942596	.924556	.907029	17	.450189	.346817	.267848
3	.915142	.888996	.863838	18	.437077	.333477	.255094
4	.888487	.854804	.822702	19	.424346	.320651	.242946
5	.862609	.821927	.783526	20	.411987	.308319	.231377
6	.837484	.790315	.746215	21	.399987	.296460	.220359
7	.813092	.759918	.710681	22	.388337	.285058	.209866
8	.789409	.730690	.676839	23	.377026	.274094	.199873
9	.766417	.702587	.644609	24	.366045	.263552	.190355
10	.744094	.675564	.613913	25	.355383	.253415	.181290
11	.722421	.649581	.584679	26	.345032	.243669	.172657
12	.701380	.624597	.556837	27	.334983	.234297	.164436
13	.680951	.600574	.530321	28	.325226	.225285	.156605
14	.661118	.577475	.505068	29	.315754	.216621	.149148
15	.641862	.555265	.481017	30	.306557	.208289	.142046
16	.623167	.533908	.458112	31	.297628	.200278	.135282
17	.605016	.513373	.436297	32	.288959	.192575	.128840
18	.587395	.493628	.415521	33	.280543	.185168	.122704
19	.570286	.474642	.395734	34	.272372	.178046	.116864
20	.553676	.456387	.376889	35	.264439	.171198	.111297
21	.537549	.438834	.358942	36	.256737	.164614	.105997
22	.521893	.421955	.341850	37	.249259	.158283	.100949
23	.506692	.405726	.325571	38	.241999	.152195	.096142
24	.491934	.390121	.310068	39	.234950	.146341	.091564
25	.477606	.375117	.295303	40	.228107	.140713	.087204

TABLE

TABLE III. Amount of L. 1 Annuity Compound Interest.

Years.	3p.cent.	4p.cent.	5p.cent.	Years.	3 p. cent.	4 p. cent.	5 p. cent.
1	1.0000	1.0000	1.0000	26	38.5530	44.3117	51.1135
2	2.0300	2.0400	2.0500	27	40.7096	47.0842	54.6691
3	3.0909	3.1216	3.1525	28	42.9309	49.9676	58.4026
4	4.1836	4.2465	4.3101	29	45.2189	52.9663	62.3227
5	5.3091	5.4163	5.5256	30	47.5754	56.0849	66.4388
6	6.4684	6.6330	6.8019				
7	7.6624	7.8983	8.1420	31	50.0027	59.3283	70.7608
8	8.8923	9.2142	9.5491	32	52.5028	62.7015	75.2988
9	10.1591	10.5828	11.0266	33	55.0778	66.2095	80.0638
10	11.4639	12.0061	12.5779	34	57.7302	69.8579	85.0670
				35	60.4621	73.6522	90.3203
11	12.8078	13.4864	14.2068	36	63.2759	77.5983	95.8363
12	14.1920	15.0258	15.9171	37	66.1742	81.7022	101.6281
13	15.6178	16.6268	17.7130	38	69.1594	85.9703	107.7095
14	17.0863	18.2919	19.5986	39	72.2342	90.4091	114.0950
15	18.5089	20.0236	21.5786	40	75.4014	95.0255	120.7998
16	20.1569	21.8245	23.6575				
17	21.7616	23.6975	25.8404	41	78.6633	99.8265	127.8398
18	23.4144	25.6454	28.1324	42	82.0232	104.8196	135.2318
19	25.1169	27.6712	30.5390	43	85.4839	110.0124	142.9933
20	26.8704	29.7781	33.0660	44	89.0484	115.4128	151.1430
				45	92.7199	121.0294	159.7002
21	28.6765	31.9692	35.7193	46	96.5014	126.8706	168.6852
22	30.5368	34.2480	38.5052	47	100.3965	132.9453	178.1194
23	32.4529	36.6179	41.4305	48	104.4084	139.2632	188.0254
24	34.4265	39.0826	44.5020	49	108.5406	145.8337	198.4267
25	36.4593	41.6459	47.7271	50	112.7969	152.6671	209.3480

TABLE IV. Present Value of L. 1 Annuity Compound Interest.

Years.	3p.cent.	4p.cent.	5p.cent.	Years.	3p.cent.	4p.cent.	5p.cent.
1	0.9709	0.9615	0.9524	26	17.8768	15.9828	14.3752
2	1.9135	1.8861	1.8594	27	18.3270	16.3296	14.6430
3	2.8286	2.7751	2.7232	28	18.7640	16.6631	14.8981
4	3.7171	3.6299	3.5460	29	19.1885	16.9837	15.1411
5	4.5797	4.4518	4.3295	30	19.6004	17.2920	15.3725
6	5.4172	5.2421	5.0757				
7	6.2303	6.0021	5.7864	31	20.0004	17.5885	15.5928
8	7.0197	6.7327	6.4632	32	20.3888	17.8736	15.8027
9	7.7861	7.4353	7.1078	33	20.7658	18.1476	16.0025
10	8.5302	8.1109	7.7217	34	21.1318	18.4112	16.1929
				35	21.4872	18.6646	16.3742
11	9.2526	8.7605	8.3064	36	21.8323	18.9083	16.5469
12	9.9540	9.3851	8.8633	37	22.1672	19.1426	16.7113
13	10.6350	9.9856	9.3936	38	22.4925	19.3679	16.8679
14	11.2961	10.5631	9.8986	39	22.8082	19.5845	17.0170
15	11.9379	11.1184	10.3797	40	23.1148	19.7928	17.1591
16	12.5611	11.6523	10.8378				
17	13.1661	12.1657	11.2741	41	23.4124	19.9931	17.2944
18	13.7535	12.6593	11.6896	42	23.7014	20.1856	17.4232
19	14.3238	13.1340	12.0853	43	23.9819	20.3708	17.5460
20	14.8775	13.5903	12.4622	44	24.2543	20.5488	17.6628
				45	24.5187	20.7200	17.7741
21	15.4250	14.0292	12.8212	46	24.7754	20.8847	17.8801
22	15.9369	14.4511	13.1630	47	25.0247	21.0429	17.9810
23	16.4436	14.8568	13.4886	48	25.2662	21.1951	18.0772
24	16.9355	15.2470	13.7986	49	25.5017	21.3415	18.1687
25	17.4131	15.6221	14.0939	50	25.7298	21.4822	18.2559

TABLE

TABLE V. Probabilities of Life at Breslaw by Dr Halley.

Age	Living	Die	Age	Living	Die	Age	Living	Die	Age	Living	Die
1	1000	145	23	579	9	45	397	101	67	172	101
2	855	57	24	573	6	46	387	100	68	162	100
3	798	38	25	567	7	47	377	100	69	152	100
4	768	28	26	560	7	48	367	100	70	142	100
5	732	22	27	553	7	49	357	100	71	131	100
6	710	18	28	546	7	50	346	100	72	120	100
7	692	12	29	539	8	51	335	100	73	109	100
8	680	10	30	531	8	52	324	100	74	98	100
9	670	9	31	523	8	53	313	100	75	88	100
10	661	8	32	515	8	54	302	100	76	78	100
11	653	7	33	507	8	55	292	100	77	68	100
12	646	6	34	499	9	56	282	100	78	58	99
13	640	6	35	490	9	57	272	100	79	49	98
14	634	6	36	481	9	58	262	100	80	41	97
15	628	6	37	472	9	59	252	100	81	34	96
16	622	6	38	463	9	60	242	100	82	28	95
17	616	6	39	454	9	61	232	100	83	23	94
18	610	6	40	445	9	62	222	100	84	19	93
19	604	6	41	436	9	63	212	100	85	15	92
20	598	6	42	427	10	64	202	100	86	11	91
21	592	6	43	417	10	65	192	100	87	8	90
22	586	7	44	407	10	66	182	100	88	5	89

TABLE VI. Probabilities of Life at London by Mr Simpson.

Age	Living	Die	Age	Living	Die	Age	Living	Die	Age	Living	Die
0	1280	410	23	441	7	46	237	68	69	75	9
1	870	170	24	434	8	47	228	8	70	69	5
2	700	65	25	426	8	48	220	8	71	64	5
3	635	35	26	418	8	49	212	8	72	59	5
4	600	20	27	410	8	50	204	8	73	54	5
5	580	16	28	402	8	51	196	8	74	49	4
6	564	13	29	394	9	52	188	8	75	45	4
7	551	10	30	385	9	53	180	8	76	41	3
8	541	9	31	376	9	54	172	7	77	38	3
9	532	8	32	367	9	55	165	7	78	35	3
10	524	7	33	358	9	56	158	7	79	32	3
11	517	7	34	349	9	57	151	7	80	29	3
12	510	6	35	340	9	58	144	7	81	26	3
13	504	6	36	331	9	59	137	7	82	23	3
14	498	6	37	322	9	60	130	7	83	20	3
15	492	6	38	313	9	61	123	6	84	17	3
16	486	6	39	304	10	62	117	6	85	14	2
17	480	6	40	294	10	63	111	6	86	12	2
18	474	6	41	284	10	64	105	6	87	10	2
19	468	6	42	274	10	65	99	6	88	8	2
20	462	7	43	264	9	66	93	6	89	6	1
21	455	7	44	255	9	67	87	6	90	5	1
22	448	7	45	246	9	68	81	6	91	4	1

TABLE VII. Value of an Annuity of L. 1 for a Single Life, according to Mr De Moivre's Hypothesis.

Age	3 p. C.	4 p. C.	5 p. C.	Age	3 p. C.	4 p. C.	5 p. C.
9.10	19.868	16.882	14.607	50	12.511	11.344	10.348
8.11	19.736	16.791	14.544	51	12.255	11.135	10.176
7.12	19.604	16.698	14.480	52	11.994	10.921	9.999
6.13	19.469	16.604	14.412	53	11.729	10.702	9.817
5.14	19.331	16.508	14.344	54	11.457	10.478	9.630
4.15	19.192	16.410	14.271	55	11.183	10.248	9.437
3.16	19.050	16.311	14.197	56	10.902	10.014	9.239
2.17	18.905	16.209	14.123	57	10.616	9.773	9.036
1.18	18.759	16.105	14.047	58	10.325	9.527	8.826
0.19	18.610	15.999	13.970	59	10.029	9.275	8.611
4.20	18.458	15.891	13.891	60	9.727	9.017	8.389
3.21	18.305	15.781	13.810	61	9.419	8.753	8.161
2.22	18.148	15.669	13.727	62	9.107	8.482	7.926
1.23	17.990	15.554	13.642	63	8.787	8.205	7.684
0.24	17.827	15.437	13.555	64	8.462	7.921	7.435
3.25	17.664	15.318	13.466	65	8.132	7.631	7.179
2.26	17.497	15.197	13.375	66	7.794	7.333	6.915
1.27	17.327	15.073	13.282	67	7.450	7.027	6.643
0.28	17.154	14.946	13.186	68	7.099	6.714	6.362
3.29	16.979	14.816	13.088	69	6.743	6.394	6.073
4.30	16.800	14.684	12.988	70	6.378	6.065	5.775
3.31	16.620	14.549	12.855	71	6.008	5.728	5.468
2.32	16.436	14.411	12.780	72	5.631	5.383	5.152
1.33	16.248	14.270	12.673	73	5.246	5.029	4.826
0.34	16.057	14.126	12.562	74	4.854	4.666	4.489
3.35	15.864	13.979	12.449	75	4.453	4.293	4.143
2.36	15.666	13.829	12.333	76	4.046	3.912	3.784
1.37	15.465	13.676	12.214	77	3.632	3.520	3.415
0.38	15.260	13.519	12.091	78	3.207	3.111	3.034
3.39	15.053	13.359	11.966	79	2.776	2.707	2.641
4.40	14.842	13.196	11.837	80	2.334	2.284	2.235
3.41	14.626	13.028	11.705	81	1.886	1.850	1.816
2.42	14.407	12.858	11.570	82	1.429	1.406	1.384
1.43	14.185	12.683	11.431	83	0.961	0.950	0.937
0.44	13.958	12.504	11.288	84	0.484	0.481	0.476
3.45	13.728	12.322	11.142	85	0.000	0.000	0.000
2.46	13.493	12.135	10.992				
1.47	13.254	11.944	10.837				
0.48	13.012	11.748	10.679				
3.49	12.764	11.548	10.515				

The values of ages under 10 are greater by the hypothesis; but, as the hypothesis does not apply to the first period of life, we have marked these ages against such as correspond nearly in value.

TABLE

TABLE VIII. Value of an Annuity of L.1 on a Single Life, according to Mr Simpson's Table.

Age	3p.cent	4p.cent	5p.cent	Age	3p.cent	4p.cent	5p.cent	Age	3p.cent	4p.cent	5p.cent
6	18.8	16.2	14.1	31	14.8	12.9	11.4	56	10.1	9.1	8.4
7	18.9	16.3	14.2	32	14.6	12.7	11.3	57	9.9	8.9	8.2
8	19.0	16.4	14.3	33	14.4	12.6	11.2	58	9.6	8.7	8.1
9	19.0	16.4	14.3	34	14.2	12.4	11.0	59	9.4	8.6	8.0
10	19.0	16.4	14.3	35	14.1	12.3	10.9	60	9.2	8.4	7.9
11	19.0	16.4	14.3	36	13.9	12.1	10.8	61	8.9	8.2	7.7
12	18.9	16.3	14.2	37	13.7	11.9	10.6	62	8.7	8.1	7.6
13	18.7	16.2	14.1	38	13.5	11.8	10.5	63	8.5	7.9	7.4
14	18.5	16.0	14.0	39	13.3	11.6	10.4	64	8.3	7.7	7.3
15	18.3	15.8	13.9	40	13.2	11.5	10.3	65	8.0	7.5	7.1
16	18.1	15.6	13.7	41	13.0	11.4	10.2	66	7.8	7.3	6.9
17	17.9	15.4	13.5	42	12.8	11.2	10.1	67	7.6	7.1	6.7
18	17.6	15.2	13.4	43	12.6	11.1	10.0	68	7.4	6.9	6.6
19	17.4	15.0	13.2	44	12.5	11.0	9.9	69	7.1	6.7	6.4
20	17.2	14.8	13.0	45	12.3	10.8	9.8	70	6.9	6.5	6.2
21	17.0	14.7	12.9	46	12.1	10.7	9.7	71	6.7	6.3	6.0
22	16.8	14.5	12.7	47	11.9	10.5	9.5	72	6.5	6.1	5.8
23	16.5	14.3	12.6	48	11.8	10.4	9.4	73	6.2	5.9	5.6
24	16.3	14.1	12.4	49	11.6	10.2	9.3	74	5.9	5.6	5.4
25	16.1	14.0	12.3	50	11.4	10.1	9.2	75	5.6	5.4	5.2
26	15.9	13.8	12.1	51	11.2	9.9	9.0				
27	15.6	13.6	12.0	52	11.0	9.8	8.9				
28	15.4	13.4	11.8	53	10.7	9.6	8.8				
29	15.2	13.2	11.7	54	10.5	9.4	8.6				
30	15.0	13.1	11.6	55	10.3	9.3	8.5				

TABLE IX. Value of an Annuity of L. 1 on two Joint Lives, according to Mr De Moivre's Hypothesis.

Ages.	3 p. C.	4 p. C.	5 p. C.	Ages.	3 p. C.	4 p. C.	5 p. C.
10	15.206	13.342	11.855	30	12.434	11.182	10.133
15	14.878	13.093	11.661	35	12.010	10.838	9.854
20	14.503	12.808	11.430	40	11.502	10.428	9.514
25	14.074	12.480	11.182	45	10.898	9.936	9.112
30	13.585	12.102	10.884	50	10.183	9.345	8.620
35	13.025	11.665	10.537	55	9.338	8.634	8.018
40	12.381	11.156	10.128	60	8.338	7.779	7.280
45	11.644	10.564	9.646	65	7.161	6.748	6.373
50	10.796	9.871	9.074	70	5.777	5.505	5.254
55	9.822	9.059	8.391				
60	8.704	8.105	7.572	35	11.632	10.530	9.600
65	7.417	6.980	6.585	40	11.175	10.157	9.291
70	5.936	5.652	5.391	45	10.622	9.702	8.913
				50	9.955	9.149	8.450
15	14.574	12.860	11.478	55	9.156	8.476	7.879
20	14.225	12.593	11.266	60	8.202	7.658	7.172
25	13.822	12.281	11.022	65	7.066	6.662	6.294
30	12.359	11.921	10.736	70	5.718	5.450	5.203
35	12.824	11.501	10.402				
40	12.207	11.013	10.008	40	10.777	9.826	9.014
45	11.496	10.440	9.541	45	10.283	9.418	8.671
50	10.675	9.767	8.985	50	9.677	8.911	8.244
55	9.727	8.975	8.318	55	8.936	8.283	7.710
60	8.632	8.041	7.515	60	8.038	7.510	7.039
65	7.377	6.934	6.544	65	6.951	6.556	6.198
70	5.932	5.623	5.364	70	5.646	5.383	5.141
20	13.904	12.341	11.067	45	9.863	9.063	8.370
25	13.531	12.051	10.840	50	9.331	8.619	7.987
30	13.098	11.711	10.565	55	8.662	8.044	7.500
35	12.594	11.314	10.278	60	7.831	7.332	6.875
40	12.008	10.847	9.870	65	6.807	6.425	6.080
45	11.325	10.297	9.420	70	5.556	5.300	5.063
50	10.536	9.648	8.880	50	8.892	8.235	7.602
55	9.617	8.879	8.233	55	8.312	7.738	7.230
60	8.549	7.967	7.448	60	7.568	7.091	6.664
65	7.308	6.882	6.495	65	6.623	6.258	5.926
70	5.868	5.590	5.333	70	5.442	5.193	4.964
25	13.192	11.786	10.621	55	7.849	7.332	6.873
30	12.794	11.468	10.367	60	7.220	6.781	6.386
35	12.333	11.095	10.067	65	6.379	6.036	5.724
40	11.776	10.655	9.708	70	5.291	5.053	4.833
45	11.130	10.131	9.278	60	6.737	6.351	6.004
50	10.374	9.509	8.761	65	6.043	5.730	5.444
55	9.488	8.766	8.134	70	5.081	4.858	4.653
60	8.452	7.880	7.371	65	5.547	5.277	5.031
65	7.241	6.826	6.440	70	4.773	4.571	4.385
70	5.826	5.551	5.294	70	4.270	4.104	3.952

TABLE X. Value of an Annuity of L.1 for two Joint Lives, according to Mr Simpson's Table of Probabilities for London.

Ages.	3p cent	4p cent	5p cent	Ages.	3p cent	4p cent	5p cent	Ages.	3p cent	4p cent	5p cent
10	14.7	13.0	11.6	25	11.8	10.5	9.4	45	8.3	7.4	6.7
15	14.3	12.7	11.3	30	11.3	10.1	9.0	50	7.9	7.1	6.5
20	13.8	12.2	10.8	35	10.7	9.6	8.6	55	7.4	6.7	6.2
25	13.1	11.6	10.2	40	10.0	9.1	8.2	60	6.5	6.3	5.8
30	12.3	10.9	9.7	45	9.4	8.5	7.8	65	6.3	5.8	5.4
35	11.5	10.2	9.1	50	8.7	7.9	7.3	70	5.6	5.3	5.0
40	10.7	9.6	8.6	55	8.0	7.4	6.8	75	4.9	4.7	4.5
45	10.0	9.0	8.1	60	7.3	6.8	6.3	—	—	—	—
50	9.3	8.4	7.6	65	6.6	6.2	5.8	50	7.6	6.8	6.2
55	8.6	7.8	7.1	70	5.9	5.6	5.3	55	7.2	6.5	6.0
60	7.8	7.2	6.6	75	5.1	4.9	4.7	60	6.7	6.1	5.7
65	6.9	6.5	6.1	—	—	—	—	65	6.2	5.7	5.3
70	6.1	5.8	5.5	30	10.8	9.6	8.6	70	5.5	5.2	4.9
75	5.3	5.1	4.9	35	10.3	9.2	8.3	75	4.8	4.6	4.4
—	—	—	—	40	9.7	8.8	8.0	—	—	—	—
15	13.9	12.3	11.0	45	9.1	8.3	7.6	55	6.9	6.2	5.7
20	13.3	11.8	10.5	50	8.5	7.8	7.2	60	6.5	5.9	5.5
25	12.6	11.2	10.1	55	7.9	7.3	6.7	65	6.0	5.6	5.2
30	11.9	10.6	9.5	60	7.2	6.7	6.2	70	5.4	5.1	4.8
35	11.2	10.0	9.0	65	6.5	6.1	5.7	75	4.7	4.5	4.3
40	10.4	9.4	8.5	70	5.8	5.5	5.2	—	—	—	—
45	9.6	8.8	8.0	75	5.1	4.9	4.7	60	6.1	5.6	5.2
50	8.9	8.2	7.5	—	—	—	—	65	5.7	5.3	4.9
55	8.2	7.6	7.0	35	9.9	8.8	8.0	70	5.2	4.9	4.6
60	7.5	7.0	6.5	40	9.4	8.5	7.7	75	4.6	4.4	4.2
65	6.8	6.4	6.0	45	8.9	8.1	7.4	—	—	—	—
70	6.0	5.7	5.4	50	8.3	7.6	7.0	65	5.4	4.0	4.7
75	5.2	5.0	4.8	55	7.7	7.1	6.6	65	4.9	4.6	4.4
—	—	—	—	60	7.1	6.5	6.1	75	4.4	4.2	4.0
20	12.8	11.3	10.1	65	6.4	6.0	5.6	—	—	—	—
25	12.2	10.8	9.7	70	5.7	5.4	5.1	70	4.6	4.4	4.2
30	11.6	10.3	9.2	75	5.0	4.8	4.6	75	4.2	4.0	3.9
35	10.9	9.8	8.8	—	—	—	—	—	—	—	—
40	10.2	9.2	8.4	40	9.1	8.1	7.3	75	3.8	3.7	3.6
45	9.5	8.6	7.9	45	8.7	7.8	7.1	—	—	—	—
50	8.8	8.0	7.4	50	8.2	7.4	6.8	—	—	—	—
55	8.1	7.5	6.9	55	7.6	6.9	6.4	—	—	—	—
60	7.4	6.9	6.4	60	7.0	6.4	6.0	—	—	—	—
65	6.7	6.3	5.9	65	6.4	5.9	5.5	—	—	—	—
70	6.0	5.7	5.4	70	5.7	5.4	5.1	—	—	—	—
75	5.2	5.0	4.8	75	5.0	4.8	4.6	—	—	—	—

This and the last Table are taken from Dr Price's Treatise on Reversionary Annuities.

§ 137. The interest, amount, or value of an annuity, for any sum, is found from that of L. 1 by multiplication.

If the interest or present value of any sum for a period greater than 50 years be required, take two or more terms from the tables corresponding to numbers of years, whose sum may be equal to the given number. The product of these terms, multiplied into each other, is the amount or present value of L. 1 for that period.

Ex. What is the amount of L. 1 in 80 years at 4 per cent. ?

Amount in 50 years	7.10668
Multiplied by amount in 30 years	3.24340
Amount in 80 years	<u>23.04980</u>

§ 138. To find what annuity for years or life may be purchased for any given sum, divide the given sum by the value of an annuity of L. 1.

Ex. What annuity may a person residing in London, aged 45, purchase for L. 1000, reckoning compound interest at 3 per cent. ?

Value of a life of 45 from the London tables, 12.3)1000
Annuity sought 81.3

In like manner, the principal, which will increase to a given amount, in any number of years, or the sum payable at any future time, equivalent to a given sum at present, may be found.

§ 139. To find in what time a given sum or annuity will increase to any proposed amount, when improved at a given rate of compound interest; divide the amount by the sum or annuity, and look for the quotient, or the nearest number to it, in the tables; against which you will find the number of years sought; and, when the number is not exactly found, the answer may be continued to a decimal, in the same manner as in § 64.

Ex. In what time will L. 15 amount to L. 22 : 4s. at 4 per cent. ?

15)22.2
1.4800, which corresponds to 10 years nearly.

§ 140. To find the value of two joint lives when the ages are not given in the table.

If one of the ages be given in the table, find the value of the same, when connected with the two nearest ages in the tables to the proposed ones, and take a proper arithmetical mean between these for the value of the annuity sought.

Ex. Let the ages be 40 and 66, and rate 4 per cent. the values of two joint lives of 40 and 65 is 6.556
of 40 and 70 is 5.383

Difference 1.173

And,

And, since the proposed age of the elder is only one year above 65, and the table increases by periods of 5 years, we subtract one fifth of the difference from the former value, which gives 6.322 for the value at the ages required.

If given ages be 42 and 66, neither of which are in the table, we proceed as under :

Value of two joint lives of 40 and 66, as above,	6.322
45 and 66	6.200
Difference	.122

And, if we subtract 2-5ths of the difference from the former, the remainder 6.273 is the value of two joint lives of 42 and 66.

A N

AN
INTRODUCTION
TO
MERCHANDISE.

PART III. BILLS, INVOICES, ACCOMPTS,
MONIES, WEIGHTS, AND MEASURES.

CHAP. I.
BILLS OF EXCHANGE.

§ 1. **A** BILL of Exchange is a written order for the payment of money, issued from one place, and directed to another. The practice of settling accompts, and transacting payments, between foreign merchants, by means of bills, is now universally established, and reduced to a regular system; and has contributed, along with other causes, to render the operations of modern commerce more easy, and, of consequence, more extensive. When goods are sent to a foreign country, the merchant who exports them may not incline to bring home an equal value of goods in return. The transportation of money is forbidden by the laws of several countries, and is always attended with risk and expence. By means of bills, the goods which one merchant exports are paid by those which another imports; and, if the whole value of exports and imports be unequal, the balance is settled by bills on a different country; and every merchant is enabled to clear his accompts without expence or delay, and without being engaged in inconvenient branches of trade, in order to make his payments effectual. This expedient was unknown, or at least not generally practised by the ancients. The invention is generally ascribed to the Jews, during the middle ages, who were induced to transmit their money from place to place, in order to elude the frequent exactions they

they were exposed to, or apply it in places where it afforded the greatest profit.

§ 2. The form and use of bills of exchange will appear from the following example :

No. 1. L. 150

Amsterdam, 17th March 1776.

Thirty days after date, pay this my first Bill of Exchange to Mr J. Van Ruiter, or order, one hundred and fifty pounds Sterling; value received, and place it to my accompt, as per advice.

To Mr Alex. Adair,

JACQUES VYGH.

LONDON.

We may suppose that J. Van Ruiter of Amsterdam has occasion to pay L. 150 to John Hanway of London, and applies to Jacques Vygh, who agrees to supply him with a bill for that purpose. The bill is drawn according to the above form, and delivered to Van Ruiter, who pays the value in Dutch money to Vygh; and sends the bill to Hanway, after indorsing it, by writing on the back as follows :

Pay to Mr John Hanway, or order, value in account:

J. VAN RUITER.

If the bill be transacted by merchants, Jacques Vygh may be any exporter of goods, who is therefore intitled to draw bills for the value; Van Ruiter may be any importer of goods, who has occasion to send bills to London for payment of articles which he purchases there. In places which have a frequent intercourse with each other, the bill-trade is a separate branch of business; the dealers in which supply those whose business consists in importation, and purchase from those whose business consists in exportation.

When J. Hanway receives the bill, he presents it to Alexander Adair; and, if Adair be willing to engage for the payment, he binds himself, by writing on the bill, under the signature,

Accepted,

ALEX. ADAIR.

and returns it to Hanway, who may keep it till due, and present it for payment; and, when he receives the money, he writes on the back of the bill, under the indorsement,

Received the contents, JOHN HANWAY.

And delivers the bill, thus discharged, to Adair.

If Hanway chuses, he may transfer the property of the bill by a second indorsement, which is written under the first, in the following form :

Pay Mr Henry Brooke, or order, value received,

JOHN HANWAY.

After this, the bill belongs to Brooke, who may either demand payment, or indorse it again. Thus, it may pass through any number of hands by repeated indorsements; and the person who

receives payment discharges the bill, in place of Hanway, as above. If the money be paid to a clerk or servant, he signs, as witness, under the subscription of his master.

There are generally four persons concerned in a bill of exchange: The DRAWER, *J. Vygh*, by whose order the money is paid; the REMITTER, *J. Van Ruiter*, at whose desire it is drawn, and who sends it to the place of payment; the POSSESSOR, *John Hanway*, to whom the bill is sent, and who is intitled to receive the payment; and the DRAWEE, *Alex. Adair*, to whom it is directed, and who, after he accepts it, is called the ACCEPTER. If the bill pass from hand to hand, by indorsement, there are several possessors, each of whom is called the indorsee, in respect to the person from whom he received it, and the indorser, in respect to the person to whom he transfers it. Thus, Hanway is indorsee to Van Ruiter, but indorser to Brooke. If Van Ruiter go to London himself and receive payment, there are only three persons concerned, and the business is finished without any indorsement.

The above bill, before it be accepted, is often termed *J. Vygh's* draught, and, afterwards, *Alexander Adair's* acceptance.

§ 3. We shall now give some more specimens of bills under different circumstances, and subjoin some observations on their several clauses, and the incidents which occur in the course of their negotiation.

No. 2. Lrs. 1500

London, 10th June 1776.

At usance, pay this my only Bill of Exchange to Monsieur Pierre La Roche, or order, one thousand five hundred Livres Tournois, value received, and place it to my accompt, with or without advice.

To Mr. J. Godefroy,
PARIS.

WILLIAM MERCHANT.
Accd. J. GODEFROY.

No. 3. L. 248 : 16 : 8

London, 15th August 1776.

Twenty days after sight, pay this, my first per Exchange, to Mr Patrick Oharo, or order, two hundred and forty-eight pounds sixteen shillings and eight pence British, at the current exchange, value in accompt, and place it to my accompt, without further advice.

To Mr Simon Fitz Herbert,
DUBLIN.

J COLEBROOKE.
23d Aug. accd.
SIMON FITZ HERBERT.

No. 4. *f.* 876:12.

Edinburgh, 18th September 1776.

Thirty days after sight, pay this, our first per Exchange, to Mr T. Van Egmont, or order, eight hundred and seventy-six guilders twelve stivers current, value received, and place it to our accompt, with or without advice.

To Mr J. Murdoh,
ROTTERDAM.

MURRAY & ROBERTSON.
30th Sept. accd. J. MURDOH.
No.

No. 5 L. 300.

Edinburgh, 12th Nov. 1776.

Against the thirty-first day of December next, pay this, our first per Exchange, to Mr James Hope, or order, three hundred pounds Sterling, value received from Mr Alexander Drysdale, and place it as per advice.

To Mr William Smith,
LONDON.

CRAWFORD & HUNTER.
Accd. per procuration of W. Smith.
JAMES GENTLE.

No. 6. Milrees 275.

Lisbon, 18th June 1776.

At two and a half usance, pay this, our first per Exchange, to the order of Mr Samuel Malcher, two hundred and seventy-five milrees, at five shillings and eight-pence per milree, value in accompt with Mr J. L. and place it to your accompt, as per advice.

To Mr Thomas Beckford,
LONDON.

FRANCIS PALYART & Co,

A second Bill for the same.

No. 6 Milrees 275.

Lisbon, 18th June 1776.

At two and a half usance, pay this, our second per Exchange, (first not paid), to the order of Mr Samuel Malcher, two hundred and seventy-five milrees, at five shillings and eight-pence per milree, value in accompt with Mr J. L. and place it to your accompt, as per advice.

To Mr Thomas Beckford,
LONDON.

FRANCIS PALYART & Co,

No. 7. L. 500.

St Christophers, 6th June 1776.

Sixty days after sight, pay this, our fourth per Exchange, (first, second, and third, not paid), in London, to Mr A. Seton, or order, five hundred pounds Sterling, value received, and place it to accompt of Mr J. Nugent, as per advice.

To Mr Al. Guthrie, EDIN.
Payable in LONDON.

HENRY HILL & SON,
10th Aug. accepted
ALEX GUTHRIE.

Payable at the house of J. Smith.

A French BILL.

No. 8. f. 550.

A Paris, ce 12me Sept. 1775.

A double usance, payez per cette premiere de change, à Monf. Thomas Meldurp, ou à son ordre, cinque cens cinquante florins du banc, valeur reçue de Monf. P. Barillon, et passez a compte, suivant l'avis de votre tres humble serviteur,

*A Monsieur T. Kempfer,
Amsterdam.*

Jean Merchant.

An Inland BILL.

No. 9 L. 1000

York, 18th May 1776.

At sight, pay to the Right Hon. Earl of Derby, or order, one

D d 2

thousand

thousand pounds, value received, and place it to accompt of the York Banking Co. as advised.

To Messrs Honeywood and Co. R. PRITCHARD, Treasurer.
LONDON.

§ 4. The clauses in a regular bill are,

1st, The sum, L. 150, which is generally marked in figures at the top of the bill, towards the left hand.

2d, The place and date, (*Amsterdam, 17th March 1776*), which is written on the same line, towards the right hand.

3d, The time of payment, (*Thirty days after date*), in which clause the number is always expressed in words. Bills are generally payable in a certain number of days, weeks, or months, after date; sometimes at sight, or on demand, as No. 9.; sometimes at so many days, weeks, or months, after sight, as No. 3. 4. 7.; which form is generally used in bills from America and the East Indies, on account of the uncertainty of their coming to hand at any fixed time. Sometimes on a certain day, which is neither connected with the date nor presentment of the bill, as No. 5. If the payment be connected with an uncertain event, as a month after the arrival of a ship, the bill is reckoned irregular, and is not intitled to the usual privileges. Foreign bills are often drawn at usance, at double or treble usance, at half usance, or the like, as No. 2. 6. 8. *Usance* signifies the common time allowed for payment by the custom of the places where the bills are transacted.

4th, The number of the bill, (*Pay this my first Bill of Exchange.*) If the bill be lost, the drawer is obliged to give a second, wherein that clause is thus expressed, *Pay this our second Bill of Exchange, first not paid.* In like manner, a third bill, or more, may be procured, if necessary; and all subsequent bills must be exact copies of the first, in all other parts, except the clause of the number; see No. 6. 7. In the British colonies, four bills on Britain are generally made out at the same time, which are called a Set of Exchange, and transmitted by different ships, as a security against accidents and delays. If there be no reason to think a second bill will be needed, that clause may be expressed as in No. 2.; and, in inland bills, the clause is sometimes entirely omitted, as in No. 9.

5th, The person to whom the order is payable (*To J. Van Ruiter, or order.*) The words, *or order*, which are always annexed, empower him to transfer the property of the bill by indorsement. If it be known that he is resolved to indorse it, that clause may be expressed as in No. 6. It is neither necessary nor usual to annex the remitter's designation.

6th, The sum, (*one hundred and fifty pounds Sterling*), which is always written in words. If there be different kinds of money at the place of payment, the kind which the payment must be made in is mentioned: Therefore, the word Sterling is necessary in bills payable

payable in Scotland, as otherwise Scots money might be understood; but, in English bills, where there is no other kind of money, that word is often omitted.

Bills are generally payable in the money which is current at the place of payment. If the sum be expressed in the money of the place where it is drawn, the rate of exchange should be mentioned, or, it may be drawn payable at the current exchange, which, in that case, is settled between the parties, according to the rate which prevails at the time of payment. See No. 3. 6.

7th, The consideration for which the bill is given, (*Value received*), if the money be instantly paid; *Value in accompt*, if it remain a debt due to the drawer, as in No. 3. *Value received from Mr A. D.* if the money be paid by another person, as in No. 5. 8. *Value in Accompt with Mr J. L.* if the drawer is to settle with another person, as in No. 6.

8th, The direction given to the person on whom the bill is drawn, in what manner he should charge it, (*and place it to my accompt*). If the bill is drawn by desire, or on accompt of another person, the payer is directed to place it accordingly, as in No. 7.

9th, The clause of advice, (*as per advice*), if it be intended that no regard should be paid to the bill unless a separate letter of advice come to hand; *without further advice*, when no separate letter is written; *with or without advice*, when a letter of advice is intended, if it be the drawer's desire that the bill should be honoured, although the letter of advice do not come to hand.

10th, The direction, (*To Mr Alexander Adair, London*), which is usually written towards the left hand.

The place of payment is not commonly mentioned, being understood at the dwelling-house or office of the acceptor; but, if a bill is intended to be paid any where else, the place of payment is generally mentioned, both in the body of the bill and in the direction, as in No. 7. though either of these is sufficient.

11th, The signature or subscription, (*Jacques Vygh*). The common way of signing any paper is, by the person's Christian name and surname. Peers sign by the title of their peerage; Peereesses by their Christian names, and title of their peerage; Bishops by their Christian names, and title of their see. Two or more merchants in company assume some denomination, which is called their *firm*, under which their business is conducted; and all the partners use it in subscribing papers which relate to the business of the company. The firm generally consists of the surnames of the partners, as *Murray & Robertson*, No. 4.; but, if one of the partners be superior to the others, by age, fortune, or relation, his name is sometimes the only one in the firm, and the others are comprehended by some general expression, as *Francis Palyart & Co.* No. 6. *Henry Hill & Son*, No. 7.

A procuration is a deed whereby one person authorises another
to

to subscribe for him, and binds himself to be answerable for his deeds. If a clerk subscribe, by procuration, for his master, he mentions the same, along with his subscription, as in the acceptance of No. 5. If the officer of a public company execute any deed for the company, he annexes his office to his subscription, as in No. 9.

Merchants always subscribe their names or firms in an uniform manner, and in a larger character than their common writing. It was formerly the custom with many to embellish their signatures by some peculiar marks of distinction; but a plain subscription is now more approved of; and experience shows that it is more difficult to counterfeit.

The 1st, 4th, 8th, and 9th, of these particulars, are proper and common, but not essential. The clause of value is required by statute, in order to intitle the possessor of the bill to summary execution; all the other clauses are necessary to render the sense complete.

§ 5. The incidents which bills are subject to after they are delivered by the drawer, are indorsement, acceptance, payment, and protest.

I. The **INDORSEMENT** is commonly written across the paper, on the back of the bill, and against the end of the line. It is not necessary to mention the place or date; but, if a bill drawn in England, and also payable in England, be sent abroad in the course of business, an indorsement, dated from a foreign place, has the effect to bring it under the regulations of foreign bills; whereas, if the indorsement be not dated, the bill, after it is sent back to England, carries no evidence of having been abroad, and is considered as an inland one. The possessor of a bill may indorse it blank, by writing his signature on the back of it; and the bill, in this situation, may pass through several hands; and the last possessor may fill up the indorsement in his own favour: But it is not safe to send bills by post, unless the indorsements be filled up.

§ 6. II. The **ACCEPTANCE** is written at the foot of the bill. A bill should be presented for acceptance as soon as it comes to hand; and if the person on whom it is drawn subscribe his name, the initials of his name, or even mark a character or number on the bill, it is sufficient to bind him for the payment. If the bill be drawn payable after sight, he marks the date of his acceptance, in order to fix the time of payment, as in No. 3. 4. 7. If he hesitate with regard to acceptance, the possessor may mark the date when it is presented, in order to fix the time of payment. In London, bills are generally left at the house of the drawer for acceptance, and called for next day.

If the bill be not payable at the place where the acceptor resides, and no particular house be specified in the bill for payment, it is proper

proper to add to his acceptance the house at which he intends to pay it, as in No. 7. The bill is then said to be domiciled.

§ 7. III. PAYMENT of a bill should be made exactly when due. In order to determine when a bill falls due, the learner must be acquainted with the *usage*, the days of grace, and the *style* used in different countries.

Usage between Britain and France is	1 month
and The Netherlands the same	
and Spain	2 months
and Portugal	3 months
and Italy	3 months

Between Holland and Spain, Portugal and Italy, 3 months.

Between Holland and France, Flanders, Brabant, and Geneva, 1 month.

Between Vienna, Frankfort, or Nuremberg and Ham-
burgh, 14 days sight.

In most places, it is an established custom to allow a few days for payment, called *respite days*, or *days of grace*, beyond the precise term mentioned in the bill. In Britain, 3 days are allowed; in the Netherlands, Portugal, and Venice, 6; in Naples, Denmark, and Norway, 8; in France, Dantzic, and Koninsberg, 10; in Sweden and Hamburgh, 12; in Spain, 14; at Rome, 15.

The calendar for the computation of years and months, which is now called the *old style*, was enacted by Julius Cæsar, and was observed universally in Europe for about 16 centuries. After so long a trial, it was found not to correspond exactly with the course of the sun; and therefore was corrected by order of Pope Gregory XIII. in the year 1582. The Gregorian or *new style* is now 11 days earlier than the old, so that the 12th day of any month *new style* corresponds with the first day *old style*. The *new style* was immediately followed in countries where the Pope's supremacy was acknowledged, and has since been adopted in several Protestant countries; but the *old style* is still used in Russia, Denmark, and some Protestant states in Germany and Switzerland.

A bill dated from Russia on the 26th January, payable one month after date, would fall due on the 9th of March. The 26th January *old style* is the same as the 6th February *new style*; and a bill dated on that day, payable one month after, is due, strictly, on the 6th of March, or, allowing three days of grace, on the 9th of the same. The difference of *style* is computed at the date of the bill; if it had been computed at the time of falling due, the above mentioned bill would not have been due till the 12th of March. In order to prevent mistakes, sometimes the *style* is mentioned, and sometimes the date, by both *styles*, is expressed. Thus, 15th January, O. S. or $\frac{1}{2}$ January.

§ 8. IV. PROTEST is an instrument in favour of the possessor of a bill which is not duly honoured. If the person to whom a bill is directed refuse to accept, the bill may be protested for non-acceptance. If it be not punctually paid, it is protested for non-payment. The protest is taken by a notary-public, in presence of two witnesses, and contains an exact copy of the bill, a relation that acceptance or payment has been demanded and refused, and for what reason, if any be assigned; and a declaration that all parties concerned shall be accountable to the possessor for the value, with damages. A bill must be protested for non-payment on the last day of grace. It cannot be protested sooner, because payment cannot be demanded till then; and, if it be neglected, even for a single day, the possessor loses recourse against the drawer and indorsers, and the acceptor only remains bound for the value. Foreign bills should be returned, with protest, in course of post. Inland bills may be kept fourteen days, but not longer.

§ 9. As bills of exchange have contributed much to the convenience of commerce, they have been favoured in most mercantile countries with peculiar privileges, and intitle the possessor to more speedy execution, for enforcing payment, than is granted for other debts. This has given rise to the custom of granting obligations for debts, in the form of bills, that they may be intitled to the same privileges; of which the following are specimens:

L. 100. London, 12th May 1776.

Sixty days after date, pay to me, or order, at Lloyd's coffee-house, one hundred pounds, value received of

To Mr William Bate,
LONDON.

JOHN BANKER.
Accd. WILLIAM BATE.

L. 74. Edinburgh, 9th October 1776.

Six months after date, pay to us, or order, at our house here, seventy-four pounds Sterling, value delivered you in linen by

To Mr James Innes,
EDINBURGH.

SPENCE & GAIRDNER.
Accd JAMES INNES.

L. 300. Edinburgh, 1st August 1775.

One day after date, pay to me, or order, at your house here, three hundred pounds Sterling, value delivered you by

To Mr Robert Williamson,
EDINBURGH.

JAMES SMITH.
Accd. ROB. WILLIAMSON.
To bear interest at 4 per cent.

§ 10. Promissory notes are sometimes granted to the same purpose. These are intituled, in England and France, to the same summary execution as bills; and, by 12th Geo. III. c. 72. the same privilege is extended to promissory notes in Scotland.

I promise to pay to Mr James Grant, or order, on demand, five hundred pounds Sterling, with interest at four per cent. till repaid.
Edinburgh, 6th June 1776.

L. 500.

RICHARD GILLES.

We promise to pay Mr Martin Mowbray, or order, six months after date, forty pounds Sterling, value received in goods.
Edinburgh, 9th June 1776.

L. 40.

HUNTER & STIRLING.

I promise to pay to Mr J. Hill, or bearer, on demand, one hundred pounds, value received,

London, 12th June 1776.

JAMES SMITH.

Promissory notes, payable to the bearer, pass from hand to hand without indorsement.

FORMS OF RECEIPT.

Received from Mr Abraham Harman, fifty pounds, to be repaid, with interest, on demand. London, 12th July 1768.

L. 50.

JOHN NOURSE.

Received of Mr James Jamieson, seventy-eight pounds Sterling, in full of all demands preceding this date.

Glasgow, 12th July 1775.

JOHN HANDASIDE.

L. 78.

Received this 9th June 1776, from Mr Roger Hog, London, one hundred pounds Sterling, on account of Mr William Hog of Edinburgh,

WILLIAM TRAVELLER.

L. 100.

I Thomas Trusty, factor to the Right Honourable Earl Angus, grant me to have received from John Husband, tenant in Rosfield, one hundred pounds Sterling; which, together with five pounds for cefs paid by him, for which he had delivered the collector's receipt, is in full of one year's rent of the lands of Rosfield, possessed by him from the said Earl, for crop javiic and seventy-four years, and I hereby discharge the same. In witness whereof, I have written and subscribed these presents, this fifteenth day of May javiic and seventy-five years,

THOMAS TRUSTY.

C H A P. II.

MONIES, WEIGHTS, AND MEASURES.

SECTION I.

BRITISH WEIGHTS AND MEASURES.

§ 11. **T**ABLES of the monies, weights, and measures, used in Britain, were given Part I. § 13. It is necessary, for the convenience of commerce, that an uniformity should be observed in these articles, and regulated by proper standards. A foot-rule may be used as the standard for measures of length, a bushel for measures of capacity, and a pound for weights. There should be only one authentic standard of each kind, formed of the most durable materials, and kept with all possible care. A sufficient number of copies, exactly corresponding to the principal standard, may be distributed for adjusting the weights and measures that are made for common use. There are several standards of this kind both in England and Scotland*.

If any one of the standards above mentioned be justly preserved, it will serve as a foundation for the others; by which they may be corrected, if inaccurate, or restored, if entirely lost. For instance, if we have a standard foot, we can easily obtain an inch, and can make a box, which shall contain a cubical inch, and may serve as a standard for measures of capacity. If it be known that a pint contains 100 cubical inches, we may make a vessel 5 inches square, and 4 inches deep, which will contain a pint. If the standard be required in any other form, we may fill this vessel with water, and regulate another to contain an equal quantity. Standards for weights may be obtained from the same foundation; for, if we know how many inches of water weigh a pound, we have only to measure that quantity, and the weight which balances it may be assumed as the standard of a pound.

Again, if the standard of a pound be given, the measure of an inch may be obtained from it: for we may weigh a cubical inch of water, and pour it into a regular vessel; and, having noticed
how

* The English standards are kept in the Exchequer chamber, by an officer called the Clerk of the Market. The Scottish standards are distributed among the oldest boroughs. The Elwand is kept at Edinburgh, the Pint at Stirling, the Pound at Larnark, and the Firiot at Linlithgow.

how far it is filled, we may make another vessel of like capacity, in the form of a cube. The side of this vessel may be assumed as the standard for an inch; and standards for a foot, a pint, or a bushel, may be obtained from it. Water is the most proper substance for regulating standards; for all other bodies differ in weight from others of the same kind; whereas, it is found by experiment, that spring and river water, rain, and melted snow, and all other kinds, have the same weight; and this uniformly holds in all countries when the water is pure, alike warm, and free from salt and minerals.

§ 12. Thus, any one standard is sufficient for restoring all the rest. It may further be desired, to hit on some expedient, if possible, for restoring the standards, in case that all of them should ever fall into disorder, or should be forgotten, through the length of time, and the vicissitudes of human affairs. This seems difficult, as no words can convey a precise idea of a foot rule or a pound weight. Measures, assumed from the dimensions of the human body, as a foot, a handbreadth, or a pace, must nearly be the same in all ages, unless the size of the human race undergo some change; and, therefore, if we know how many square feet a Roman acre contained, we may form some judgment of the nature of the law which restricted the property of a Roman citizen to seven acres; and this is sufficient to render history intelligible; but it is too inaccurate to regulate measures for commercial purposes. The same may be said of standards, deduced from the measure of a barley-corn, or the weight of a grain of wheat. If the distance of two mountains be accurately measured and recorded, the nature of the measure used will be preserved in a more permanent manner than by any standard; for, if ever that measure fall into disuse, and another be substituted in its place, the distance may be measured again, and the proportion of the standards may be ascertained, by comparing the new and ancient distances.

§ 13. But, the most accurate and unchangeable manner of establishing standards is, by comparing them with the length of pendulums. The longer a pendulum is, it vibrates the slower; and it must have one precise length in order to vibrate in a second. The slightest difference in length will occasion a difference in the time; which will become abundantly sensible, after a number of vibrations, and will be easily observed, if the pendulum be applied to regulate the motion of a clock. The length of a pendulum which vibrates seconds in London, is about $39\frac{1}{8}$ inches, is constantly the same at the same place, but it varies a little with the latitude of the place, being shorter as the latitude is less. Therefore, though all standards of weights and measures were lost, the length of a second pendulum might be found by repeated trials; and, if the pendulum be properly divided, the just measure of an inch will be obtained; and from this all other standards may be restored.

Various statutes have been enacted for regulating and enforcing an uniformity of weights and measures; and, by the articles of union, the English standards are established by law over all Great Britain. But the force of custom is so strong, that these statutes have been ill observed. The Scottish standards are still universally retained for many purposes; and, likewise, a variety of local weights and measures are used in particular places of both countries, which differ from the general standards of either.

MEASURES OF LENGTH.

§ 14. Lineal measure is regulated by the yard. The use of this measure was established by Henry I. of England, and the standard taken from the length of his own arm. It is divided into 36 inches, and each inch is supposed equal to 3 barley corns. When used for measuring cloth, it is divided into 4 quarters, and each quarter subdivided into 4 nails. The English ell is equal to a yard and a quarter, or 45 inches.

The Scotch *elwand* was established by King David I. and divided into 37 inches. The standard is kept in the council chamber of Edinburgh, and being compared with the English yard, is found to measure $37\frac{1}{5}$ inches; and therefore the Scotch inch and foot are larger than the English, in the proportion of 186 to 185; but this difference being inconsiderable, is seldom attended to in practice. The Scotch ell, though forbidden by law, is still used for measuring some coarse commodities, and is the foundation of the land-measure of Scotland.

A hand in horsemanship is 4 inches.

A span 9 inches.

A geometrical pace 5 feet.

A fathom, chiefly used in measuring depth, 6 feet.

Itinerary measure is regulated by Table IX. both in England and Scotland. The length of the chain is 4 poles, or 22 yards. 80 chains make a mile. The old Scotch computed miles were generally about a mile and a half.

The reel for yarn is $2\frac{1}{2}$ yards, or 10 quarters, in circuit; 120 threads make a cut, 12 cuts make a hasp or hank, and 4 hanks make a spindle.

LAND MEASURE.

§ 15. Land measure, in England, is regulated by Table VII. Because the length of a pole is five yards and a half, the square of the same contains $30\frac{1}{4}$ square yards. A square mile contains 640 square acres. In measuring fens and woodlands, 18 feet are generally allowed to the pole, and 21 feet in forest lands.

A hide of land, frequently mentioned in the earlier part of the English history, contained about 100 arable acres; and 5 hides were

were esteemed a Knight's fee. At the time of the Norman conquest, there were 243,600 hides in England.

Scotch land measure is founded on the Scotch ell, and regulated by Table VIII. The proportion between the Scotch and English acre, supposing the feet in both measures alike, is as 1369 to 1089, or nearly as 5 to 4. If the difference of the feet be regarded, the proportion is as 10000 to 7869. The length of the chain for measuring land in Scotland is 24 ells, or 74 feet.

A husband-land contains 6 acres of fock and scythe land, that is, of land that may be tilled with a plough, or mown with a scythe. 13 acres of arable land make one ox-gang, and 4 ox-gangs make a pound-land of old extent.

W E I G H T S.

§ 16. ENGLISH TROY WEIGHT is the most ancient of the different kinds used in Britain.

The pound English Troy contains 12 ounces, or 5760 grains. It was formerly used for every purpose, and is still retained for weighing gold, silver, and jewels; for compounding medicines; for experiments in natural philosophy, and for comparing different weights with each other. Goldsmiths use the divisions in Table III. and apothecaries use these in Table IV. Goldsmiths, in Scotland, divide the ounce into 16 drops, and the drop into 30 grains; but in all these ways the ounce and grain is the same, and the ounce contains 480 grains.

A carrat is a weight of 4 grains; but when that term is applied to gold, it denotes the degree of fineness. Any quantity of gold is supposed divided into 24 parts. If the whole mass be pure gold, it is said to be 24 carrats fine; if there be 23 parts of pure gold, and 1 part of base metal or alloy, it is said to be 23 carrats fine; and so on.

Pure gold is too soft to be used for coin. The standard coin of this kingdom is 22 carrats fine. A pound of standard gold is coined into $44\frac{1}{2}$ guineas, and therefore every guinea should weigh 5 dwt. $9\frac{1}{2}$ grains; but as some allowance must be made for wearing, guineas not under 5 dwt. 8 gr. and half guineas not under 2 dwt. 16 gr. cannot be refused in payment.

A pound of standard silver for coin contains 11 ounces 2 dwt. pure silver, and 18 dwt. alloy: Standard silver-plate 11 ounces pure silver, and 1 ounce alloy. A pound of silver is coined into 62 shillings; therefore the weight of a shilling should be 3 dwt. $20\frac{2}{3}$ grains.

The value of a pound of gold, when coined at the mint-price, is L. 46 : 14 : 6, and the value of a pound of silver L. 3 : 2 s.; but the current price of bullion varies like that of other commodities, according to the scarcity or demand.

§ 17. About the time of the Norman conquest, 1 lb. of silver was coined into 20 shillings, and made L. 1 of the current money of the

the realm. The value of the coin was afterwards lessened by degrees; and at present a pound Sterling in silver does not contain one third part of that quantity. The sums of money mentioned in the earlier part of the English history, must be understood according to the state of the coin which was current at the time. They may be reduced to money of our present standard, by the help of the following table, which exhibits the number of shillings coined from 1 lb. of silver, and the value of 20 of these shillings in our present money.

Years.	Reigns.	Shill. coined From 1 lb.	Value of 20s.
1066	Will. I.	21 s 4 d	L. 2 18 1½
1087	Will. II.	20 s	3 2 —
1300	Edward I.	20 s 3 d	3 1 2¼
1395	Richard II.	25 s	2 9 7½
1412	Henry IV.	32 s	1 18 9
1422	Henry V.	37 s 6 d	1 13 ¾
1426	Henry VI.	30 s	2 1 4
1461	Edward IV.	37 s 6 d	1 13 ¾
1505	Henry VII.	40 s	1 11 —
1509	Henry VIII.	45 s	1 7 6⅝
1543	Ditto	48 s	1 3 3½
1560	Elizabeth	60 s	1 — 8
1601	Ditto	62 s	1 — — *

§ 18. AVERDUPUIS WEIGHT is used in England for all purposes, except those mentioned in § 16. The pound averdupois is generally reckoned to contain 7000 grains Troy†. The ounce was formerly divided into 8 drachms, and the drachm into 3 scruples; but the present division of the ounce is into 16 drops or drachms.

This weight is used in Scotland in collecting the revenue, and in selling leather, tallow, soap, flour, bread, candle, groceries, rosin,

* This table will enable the student to compare the old prices of provisions and other commodities with the present. He will find that the prices of corn about the time of the Norman conquest was only about one tenth of the present price, and cattle were still cheaper in proportion.

It appears, by a household-book composed by the Earl of Northumberland, in the year 1512, that wheat was about 6s. 2d. per quarter, malt 4s. oats 2s. a lean ox 8s. a fat ox 13s. 4d. a sheep 1s. 8d. a hog 2s. a hen 2d. a goose 3d. French wine L. 4 : 13 : 4 per ton, an ell of linen 8d. a chaldre of coals 4s. 2d. The weight of the coin was then one third more than at present.

The prices of commodities increased slowly before the discovery of America. In the 16th century, when great quantities of gold and silver were brought from the Spanish colonies in America, the value of these metals diminished of course, and prices rose quickly, and have since continued to increase. The price of corn was formerly much more unequal than at present. A scarcity in any particular country had worse effects, because commerce was not so regular. During a dearth in the reign of Queen Elizabeth, wheat rose to upwards of L. 4 per quarter.

† By report of the committee of the House of Commons in 1759, the lb. averdupois was found to contain 7002 grains, upon an examination of the standards.

rosin, wax, pitch, wrought metals, some Baltic goods, and all goods brought from England. It is appointed by the articles of Union, as the general weight through Great Britain; but has not been adopted in Scotland, except for the above-mentioned commodities.

The following Table is used for wool weight.

7 lb	= 1 clove	$6\frac{1}{2}$ tods	= 1 wey
2 cloves	= 1 stone	2 weys	= 1 sack
2 stones	= 1 tod	12 sacks	= 1 last

56 lb old hay, or 60 lb new hay, make a truss

36 lb straw make a truss

36 trusses make a load

$19\frac{1}{2}$ cwt. lead make a fodder

14 lb make a stone, horseman's weight

5 lb glass make a stone

14 oz. butcher meat, in most places, make 1 lb.

§ 19. TRONE WEIGHT is the most ancient of the different kinds used in Scotland, and, though now forbidden by several statutes, is still used for many home commodities, and that in a very irregular manner; for the pound varies in different places, and for different purposes, from 20 to 28 Dutch ounces. In the county of Edinburgh, the allowance is $21\frac{1}{4}$ oz. for wool, $20\frac{1}{2}$ for butter and cheese, 20 for tallow, lint, hemp, and hay. It is divided into 16 of its own ounces, and 16 pounds make a stone.

§ 20. SCOTS TROY WEIGHT is nearly, if not exactly, the same as that of Paris and Amsterdam, and is generally known by the name of Dutch weight. The pound contains 7600 grains, and is divided into 16 oz. each oz. into 16 drops, and 16 lb. make a stone. The cwt. averdupois contains 103 lb. $2\frac{1}{2}$ oz. Troy. Though prohibited by the articles of Union, it is still used in weighing iron, hemp, flax, most Dutch and Baltic goods, meal, butcher meat, unwrought pewter and lead, and some other articles.

LIQUID MEASURE.

§ 21. The ENGLISH GALLON was originally founded on the Troy weight. It was appointed that 8 lb. Troy of wheat, gathered from the middle of the ear, and well dried, should make a gallon. When averdupois weight came into use, another gallon was formed from it in the same manner; which, therefore, is greater than the former, in the same proportion that the lb. averdupois exceeds the lb. Troy.

The wine gallon is now appointed to contain 231 inches; and a cylindrical vessel 7 inches diameter, and 6 inches deep, which answers almost exactly to that capacity, is also appointed to be a legal wine

wine gallon. This measure is used for wine, spirits, vinegar, oil, cyder, perry, and honey.

The ale gallon is appointed to contain 282 inches, and is used in selling malt liquors of all kinds, and in collecting the revenue of excise.

Table of Wine Measure.

2 pints	= 1 quart
2 quarts	= 1 pottle
2 pottles	= 1 gallon
10 gallons	= 1 anker
18 gallons	= 1 runlet
31½ gallons	= 1 barrel
42 gallons	= 1 tierce
2 barr.or }	= 1 hoghead
63 gallons }	
84 gallons	= 1 puncheon
2 hds.	= 1 pipe or butt
2 butts	= 1 ton

Table of Ale Measure.

2 pints	= 1 quart
2 quarts	= 1 pottle
2 pottles	= 1 gallon
8 gallons	= 1 firkin ale
9 gallons	= 1 firkin beer
2 firkins	= 1 kilderkin
4 firkins	= 1 barrel
2 barrels	= 1 hd.
1½ hds.	= 1 butt
2 butts	= 1 ton

The barrel for ale in London is 32 gallons, and the barrel for beer 36 gallons. In all other places of England, the barrel, both for ale and beer, is 34 gallons.

§ 22. The Scotch pint was formerly regulated by a standard jug of cast metal, the custody of which was committed to the borough of Stirling. This jug was supposed to contain 105 cubic inches; and though, after several careful trials, it has been found to contain only about 103½ inches, yet, in compliance with established custom, founded on that opinion, the pint *stoups* are still regulated to contain 105 inches, and the customary ale measures are about $\frac{1}{10}$ above that standard.

It was enacted by James I. of Scotland, that the pint should contain 41 ounces Trone weight of the clear water of Tay, and by James VI. that it should contain 55 Scots Troy ounces of the clear water of Leith. This affords another method of regulating the pint, and also ascertains the ancient standard of the Trone weight. As the water of Tay and Leith are alike, the Trone weight must have been to the Scots Troy weight as 55 to 41; and therefore, the pound Trone must have contained about 21½ ounces Scots Troy.

4 gills	= 1 mutchin.
2 mutchkins	= 1 choppin.
2 choppins	= 1 pint.
2 pints	= 1 quart.
4 quarts	= 1 gallon.

The Scotch quart contains 210 inches; and is, therefore, about $\frac{1}{10}$ less than the English wine-gallon, and about $\frac{1}{4}$ less than the ale-gallon.

DRY MEASURES.

§ 23. The standard for measuring corn, salt, coals, and other dry goods in England, is the Winchester bushel, which contains 2150 inches. A cylindrical vessel, $18\frac{1}{2}$ inches diameter, and 8 inches deep, is appointed to be used as a bushel, and answers to the above dimensions. The corn gallon kept at Guildhall contains $272\frac{1}{4}$ inches, but is no standard. If the Winchester bushel were regulated by it, it would contain 2178 inches.

The denominations of dry measure commonly used, are given in Table V. 4 quarters corn make a chaldron, 5 quarters make a wey or load, and 10 quarters make a ton. The bushel for coals is one Winchester bushel and one quart of water: 3 bushels make a sack, 9 bushels make a quarter or vatt, 4 quarters make a London chaldron, and 21 chaldrons make a score; 15 chaldrons London measure make 9 chaldrons Newcastle measure.

§ 24. There was formerly only one measure of capacity in Scotland; and some commodities were heaped, others *straihed*, or measured exactly to the capacity of the standard. The method of heaping was afterwards forbidden, as unequal, and a larger measure appointed for such commodities as that custom had been extended to.

The wheat firloot, used also for rye, pease, beans, salt, and grass-seeds, contains 21 pints, 1 mutchkin, measured by the Stirling jug. The barley firloot, used also for oats, malt, fruit, and potatoes, contains 31 pints. Another method of regulating the firloot was appointed, from the dimensions of a cylindrical vessel. The diameter for both measures was fixed at $19\frac{1}{8}$ inches, the depth $7\frac{1}{2}$ inches for the wheat firloot, and $10\frac{1}{2}$ for the barley firloot. A standard constructed by these measures is rather less than when regulated by the pint; and as it is difficult to make vessels exactly cylindrical, the regulation by the pint has prevailed, and the other method gone into disuse.

If the Stirling jug contain $103\frac{1}{2}$ inches, the wheat firloot will contain 2199 inches, which is more than 2 per cent. larger than the Winchester bushel; and the barley firloot will contain 3218 inches. The barley boll is nearly equal to 6 bushels*.

- 40 feet hewn timber make a load.
- 50 feet unhewn timber make a load.
- 32 gallons make a herring barrel.
- 42 gallons make a salmon barrel.
- 1 cwt. gun-powder makes a barrel.
- 256 lb. soap make a barrel.

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16

* For the local weights and measures of different counties, see a Proposal for Uniformity of Weights and Measures, printed at Edinburgh 1779.

- 10 dozen candles make a barrel.
- 12 barrels make a last.
- 12 dozen of any thing make a small grofs.
- 12 small grofs make a great grofs.

- Qu. 1. How many Scotch pints in 7356 English gallons ?
2. How many English acres in 1260 Scotch acres ?
3. How many lb. averdupois in 476 lb. English Troy ?
4. How many lb. Scotch Troy in 3 cwt. 2 qrs. 5 lb. ?
5. What is the averdupois weight of a boll wheat ?
6. What is the averdupois weight of a ton water, or 252 wine-gallons ?
7. If a cubic foot of water weigh 1000 oz. averdupois, and standard gold be 18 times heavier, what is the value of a cubic foot of standard gold ?

S E C T. I.

FOREIGN MONIES.

§ 25. THE kinds of money used in Europe are very numerous. Some are *real*, as guineas, shillings, and halfpennies, which are current coins of gold, silver, or copper. Others are *imaginary*, as pounds and pence, to which there are no single pieces of money corresponding. Some kinds are used in common accompts, as pounds, shillings, and pence; others only on particular occasions, as merks and crowns.

The *par* of the money of one nation, compared with that of another, is the intrinsic value of any piece or denomination, estimated by the weight and fineness of the gold or silver it contains.

The rate of exchange is the current value allowed for money of one country, when reduced to the money of another. This rate is not always the same as the *par* or real value; neither is it alike at all times. For instance, the just value of a French crown is 29½d.; yet sometimes 32d. are allowed in exchange, sometimes only 28d. The reason of this is, that foreign payments are transacted by bills of exchange, which rise and fall in price, like other commodities, according to their plenty and demand. But this variation is confined within a certain limit; for, if the course of exchange were to differ much from the true value, the merchants, to whom this difference was unfavourable, would have recourse to the transportation of real money, which no prohibition, contrary to their interest, would be able fully to prevent. The course of exchange is regulated by the balance of trade. Thus, the value of goods imported from France is greater than the value exported, which occasions a demand for more bills on that country than can readily be procured, and raises their value above *par*. On the other hand, more goods are exported to Portugal than im-
ported

ported from it; and therefore, the plenty of bills on that country exceeds the demand, and their value falls below par. If the communication between countries be easy and open, the course of exchange will vary less from par than when the countries are distant, and the communication obstructed by prohibitions.

Sometimes sovereign princes alter the value of their coin, while it retains the same denomination. As this changes the par, so it alters the course of exchange with foreign countries.

The course of exchange also differs according to the time at which a bill is payable. Bills at sight only should properly be valued at par; bills payable otherwise should be valued lower, in proportion to the distance of the term of payment.

There are particular kinds of money fixed by the practice of merchants, for regulating calculations of exchange. A variable sum in one country is allowed for a certain species in the other. The monies for regulating exchange are often imaginary, and sometimes different from those in which accompts are kept.

§ 26. The following general rules will direct the attentive student in all computations respecting the comparison of monies.

1st, Reduce the given sum (if necessary) to that kind of money by which exchange is computed.

2d, Reduce this, according to the given rate of exchange, into the corresponding money of the other country.

3d, Reduce the exchange-money thus found (if necessary) to the kind of money required.

We shall illustrate these rules afterwards by various examples.

§ 27. HOLLAND. *Amsterdam, &c.* Accompts are generally kept in florins or guilders, stivers, and peningens.

1 guilder or florin = 20 stivers.

1 stiver = 16 *peningens* *.

1 L. Flemish or gros = 6 guilders = 20 schillings gros.

1 schilling gros = 6 stivers = 12 *pennies gros or groots*.

1 rixdollar = $2\frac{1}{2}$ guilders or 50 stivers.

1 dollar = 2 guilders or 40 stivers.

1 ducat = $5\frac{1}{4}$ guilders or 105 stivers.

§ 28. Sums of money at Amsterdam are distinguished into bank and current. The current money is the real coin which circulates in the country. The bank money is imaginary, being the property which a person possesses in the treasure lodged in the bank. Money paid into the bank of Amsterdam cannot be re-drawn; but those who pay it have credit in the bank-books, which they can transfer at pleasure; so that it circulates in payments, and answers the purposes of trade, with equal or greater ease than real money.

No money is received into the bank that is in the least defective

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* The imaginary monies are marked in *Italics*.

in weight or fineness; and therefore the bank treasure is accounted of superior value to the current money. The difference of value is called *agio*, and varies from 2 to 5 per cent. Any circumstance that tends to increase the demand for bank-money raises the agio; and any that tends to diminish that demand, or hurt the credit of the bank, lessens the agio.

Accounts are kept in current money; bills of exchange are generally transacted in bank money.

§ 29. Exchange between Britain and Holland varies from 34 to 37 sch. grofs per L. Sterling. The par is about 36s. 7d. current; and therefore the value of a guilder is about $21\frac{7}{8}$ d.

Exchange with Brussels, Antwerp, and other places in the Netherlands, is transacted as with Holland. But their money is of less value, and therefore the course of exchange is higher.

Ex. 1. How much Sterling money in f. 5476, current exchange, 36s. 3d. agio $2\frac{1}{2}$?

$$\begin{array}{r} 102\frac{1}{2} : 100 :: 5476 \\ 205 : 200 \\ \hline 5476 \end{array}$$

$$205)1095200(f.5342 : 8 \text{ banco}$$

$$\begin{array}{r} \hline 40 \\ \hline \text{L. s. d.} \\ 435)213696(491 : 5 : 1 \end{array}$$

$$\begin{array}{r} \text{Ex. } 36 : 3 \\ 12 \\ \hline 435 \text{ d.} \end{array}$$

Here we first reduce f. 5476 current to f. 5342:8 banco, by the proportion to $102\frac{1}{2} : 100$.

Secondly, Because one pound Sterling is allowed for each 36s. 3d. Flemish, we find how often that sum is contained in the above-mentioned number of guilders; and, for that purpose, we multiply the same by 40, the number of pence grofs in a guilder, taking in 16 for the 8 stivers, which reduces it to 213696 pence grofs.

Thirdly, We also reduce the rate of exchange 36s. 3d. to 435 pence grofs.

Lastly, We divide the sum of the pence grofs 213696, by the rate of exchange reduced, or number of pence grofs in a pound Sterling; and this quotes the value in Sterling money, L. 491 : 5 : 1.

Or by decimals.

$$\begin{array}{r} .3)5342.4 \text{ guilders.} \\ \text{Rate of Ex. } 36.25)17808 \text{ schillings grofs.} \\ \hline \text{L. } 491 : 5 : 1 \end{array}$$

Here we first divide by .3, which reduces the guilders to schillings grofs, because a schilling is $\frac{1}{10}$ of a guilder. Then we divide the quotient by 36.25, the rate of exchange, which quotes the value in Sterling money.

Ex.

Ex. 2. How many current guilders in L. 1000 Sterling?

Ex. 34s. 8½ d.agio 2 per cent.

	By decimals.
L. 1000 at 34.8½	L. 1000
34	34.7083
34000	34708.3
4d. 333:4	.3
4d. 334:4	
½d. 41:8	10412.50
34708:4 sch. gros.	f. 10412:10 agio 2 per cent.
6	2
20)208250 flivers banco	208.25
f. 10412:10 banco.	20
208:5 agio.	5.00
f. 10620:15 current.	

First, We reduce L. 1000 by practice, or by decimals, to schillings gros.

Secondly, We multiply the schillings by 6, which reduces them to flivers banco.

Thirdly, We divide the flivers by 20, which reduces them to guilders banco.

Lastly, We calculate and add the agio; the sum is the answer in current guilders.

Qu. 1. How much bank money in f. 1260 current, agio 3½ per cent?

2. How much Sterling money in f. 1738:6:8. Flemish, ex. 35 s. 11 d.?

3. How much Sterling money in f. 1732 banco, ex. 35 s. 9 d.?

4. How much in f. 1273:12 s. current, ex. 35 s. 8 d. agio 3¼?

5. How many guilders banco in L. 426:10 s. ex. 36 s. 2 d.?

6. How many guilders current in L. 136:12 s. ex. 36 s. agio 4¼?

7. What is the course of exchange, when the guilder current costs 22½ d. agio 4 per cent?

8. What is the value of the current guilder, when the course of exchange is 36 s. 7 d. agio 3½ per cent.

9. A merchant in Edinburgh draws f. 1342 on Holland, at 22½ d. per f. His agent in Holland draws on London for the value, including ½ per cent. commission, exchange 35 s. 10 d. agio 3 per cent. and the merchant remits a bill to his correspondent in London for the value, including ½ per cent. commission, for which he pays ½ per cent. exchange. Required the gain or loss?

10. A merchant remits L. 1250 to Amsterdam, exchange 34 s.

11 d.

11 d. agio $3\frac{1}{4}$; and allowing his agent to retain $\frac{1}{2}$ per cent. commission, he draws as follows :

f. 1436 at $22\frac{1}{4}$.
 3782, at $22\frac{1}{2}$.
 4599 at $22\frac{5}{8}$.
 the rem. at $22\frac{1}{2}$.

Required the gain or loss?

§ 30. GERMANY. *Hamburgh*. Money is distinguished, as at Amsterdam, into bank and current : Bills are transacted in the former, accompts kept in the latter. The agio varies from 15 to 25 per cent.

Accompts are kept in marcs and schillings lubs.

1 marc lub	=	16 schillings lubs
1 schilling lub	=	12 phenings
1 pound gros	=	$7\frac{1}{2}$ marcs lubs, or 120 schillings lubs
1 schilling gros	=	6 schillings lubs
1 penny gros	=	$\frac{1}{2}$ schilling lub, or 6 phenings
1 rixdollar	=	3 marcs
1 dollar	=	2 marcs
1 ducat	=	$6\frac{1}{2}$ marcs

Exchange with Britain is transacted by allowing so many schillings and pence gros for the pound Sterling. The computation is nearly the same as with Holland ; only the marc lub consists of 16 schillings lubs, whereas the guilder consists of 20 stivers ; and the pound gros at Hamburgh is of more value than at Amsterdam. The value of the marc is 1 s. 6 d. ; and, therefore, the par of exchange is about 35 sch. $6\frac{2}{3}$ current. The course of exchange varies from 33 to 36 sch. banco.

Exchange with Holland about 33 stivers banco, per dollar of Hamburgh.

Ex. 1. How much Sterling money in 1328 marcs lubs, agio 20 per cent. exchange 33 s. 10 d. ?

$$\begin{array}{rcl} & \text{m.} & \text{m.} \quad \text{sc.} \\ 120 : 100 :: 1328 : 1106 & & 10 \text{ banco.} \\ & & 16 \end{array}$$

$$\begin{array}{rcl} \text{Ex. } 33 : 10 & & 6646 \\ \quad 6 & & 1106 \\ \hline 203 & & \hline & \text{L.} \quad \text{s.} \quad \text{d.} \\ & & (17706(87 : 4 : 5 \end{array}$$

First, We reduce the current money to banco, by a proportion stated from the agio. Then we reduce the marcs, and also the rate of exchange to schillings lubs, and divide the former by the latter.

Ex.

Ex. 2. How much Hamburg money in *f.* 1223 current of Holland, agio there 3 per cent. exchange $32\frac{1}{4}$, agio in Hamburg 18?

$$103 : 100 :: 1223 : 1187 : 7$$

20

Ex. $32\frac{1}{4}$	23747			
4	4			
131	)94988(	d. 725	m. —	s. 2 banco.
	917	2		
	328	m. 1450 : 2		
	262	261	agio at 18 per cent.	
	668	m. 1711 : 2 current.		
	655			
	13			
	x 2 &c.			

We first reduce the current guilders to banco by the agio. Then we reduce these, and also the rate of exchange, to quarter-stivers, and divide the former by the latter. The quotient is the value in dollars of Hamburg banco; the remainder, multiplied by 2 and by 16, extends the same to marcs and schillings lub. The sum in dollars, multiplied by 2, gives the value in marcs and schillings banco. And the answer in marcs and schillings current is obtained by adding the agio.

Ex. 3. A merchant in Britain owes 1200 marcs lub. in Hamburg. He may order it to be drawn on London, ex. 33 s. 9 d. agio 17, or on Holland, ex. $33\frac{1}{8}$, commission there $\frac{1}{4}$ per cent. ex. from Holland on London, 34 s. 11 d. Required, Which is the cheapest way, and how much is the difference?

M. 1200 current, agio 17, is m. 1025 : 10 banco,	
exchange 33 s. 9 d. as in Ex. 1.	L. 81 0 8
M. 1025 : 10 drawn on Holland, ex. $33\frac{1}{8}$,	
<i>f.</i> 862 : 3	
Commission, $\frac{1}{4}$ per cent.	2 : 3

$$\text{f. } 864 : 6$$

which computed as in § 29. Ex. 1. ex. 34 s. 11 d.	82 10 2
---	---------

Answer. It is best to draw on London directly, and the difference is

L. 1 9 6

The

The monies at ALTENA, LUBECK, and BREMEN, are the same as at Hamburg.

IN AUSTRIA, HUNGARY, BOHEMIA, SWABIA, and FRANCONIA, they reckon by the *rixdollar* of 90 cruitzers, par 3s. 6d. in SAXONY and HANOVER, by the *rixdollar* of 24 gros. In BRANDENBURGH and POMERANIA, 30 gros make a florin, and 3 florins make a rixdollar.

The value of the rixdollar in all these place is about 3s. 6d.

A hard dollar = $1\frac{1}{4}$ rixdollars.

A ducat = 2 hard dollars.

These places exchange with Holland and Hamburg, and also with each other, on the rixdollar, at so many per cent.

With Britain, at so many pence per rixdollar, but commonly by the way of Holland or Hamburg.

Qu. 1. How much Sterling money in m. 1728 lubs, ex. 33s. 11d. agio $17\frac{3}{4}$?

2. How much Hamburg money in L. 1768, exchange 34s. 1d. agio $19\frac{3}{8}$?

3. At what rate of exchange does the marc lub come to 1s. 4d. when the agio is 18 per cent?

4. How much Hamburg money in *f.* 726 : 12 current of Amsterdam, agio there $2\frac{1}{4}$, exchange $32\frac{1}{4}$, agio in Hamburg 16?

5. How many current guilders of Holland in 1738 marcs lubs current, agio in Holland $2\frac{1}{16}$, in Hamburg $17\frac{1}{2}$, exchange $32\frac{1}{8}$?

6. Required the value of 1233 rixdollars of Francfort, exchange on Amsterdam *R.* 135 of Francfort for *R.* 100 banco, and exchange from Amsterdam on London 35s. 1d. Required also the value of the rixdollar?

7. How many rixdollars of Berlin are equal to L. 1380, exchange from London to Hamburg 33s. 7d. and from Hamburg to Berlin 35 per cent. in favour of Hamburg?

8. A merchant in Vienna intends to remit the value of 1260 rixdollars to London. He can do it directly at 3s. $5\frac{1}{4}$: or through Amsterdam, ex. $36\frac{1}{2}$ per cent. commission there $\frac{1}{2}$ per cent. and ex. to London 35s. 3d. or through Hamburg, ex. 38 per cent. commission $\frac{1}{4}$ per cent. and ex. to London 34s. 11d. Required which is cheapest, and how much the difference is?

§ 31. DENMARK and NORWAY. *Copenhagen, Elfsneur, Bergen, &c.* Accompts are kept in rixdollars Danish, marcs, and skillings.

1 marc = 16 skillings

1 rixdollar = 6 marcs

1 ort = 4 marcs

1 ducat = 11 marcs

Exchange with Britain, from 4 to 5 rixdollars per L. Sterling. Par 4s. 6d. Sterling.

—— with Holland, about 110 rixdollars Danish per 100 rixdollars banco.

Exchange with *Hamburgh*, about 250 marcs lubs banco per 100 rixdollars Danish.

Qu. 1. What is the value of *R. 5273* drawn on *Amsterdam*, ex. 112 per cent. commission there $\frac{1}{4}$ per cent. and drawn from *Amsterdam* on *London*, ex. 35 s. 2 d.?

2. What is the value of the same drawn on *Hamburgh*, ex. 254, commission there $\frac{1}{4}$ per cent. and drawn from *Hamburgh* on *London*, ex. 33 : 1.?

3. How much Danish money in *f. 1000* current, agio 3 per cent. exchange 110?

4. How much Danish money in 1245 marcs lubs, exchange 257, agio 18?

§ 32. SWEDEN. *Stockholm, Upsal, Thorn, &c.* Accompts are kept in copper dollars, marcs, and ures.

1 copper marc = 8 ures

1 silver marc = 3 copper marcs

1 copper dollar = 4 copper marcs, value $6\frac{1}{2}$ d.

1 silver dollar = 3 copper dollars, or 4 silver marcs

1 rixdollar = 3 silver dollars

1 ducat = 2 rixdollars.

A ton gold = 100,000 rixdollars.

By a late regulation, 1 rixdollar, value 5 s. = 48 skilins, and 1 skilin = 12 runftics.

Exchange with *Britain*, at so many copper dollars per *L. Ster.*

— with *Holland* and *Hamburgh*, at so many silver marcs per rixdollar of these places.

Qu. 1. What is the value of 31758 copper dollars, exchange $39\frac{1}{2}$?

2. How much current money of *Holland* in the same sum, exchange 12?

3. How much Swedish money in *L. 1200*, ex. $40\frac{1}{2}$?

4. How much Swedish money in *f. 1000* current, ex. 13?

5. A merchant pays a debt in *Sweden*, by a credit on *Amsterdam*, exchange from *Sweden* to *Holland* 14, and from *Holland* to *Britain* 36. How much will it stand him per copper dollar?

§ 33. POLAND and PRUSSIA. *Dantzick, Koningsberg, Warsaw, &c.* Accompts are kept in Polish florins and gros.

1 florin = 30 gros

1 ort = 18 gros

1 rixdollar = 3 florins

1 ducat = 8 florins

1 Frederic d'or = 5 rixdollars

Exchange with *Britain* at so many pence per florin, par 1 s. 2 d.

— with *Holland*, so many gros per *L. Flemish* banco.

— with *Hamburgh*, so many gros per rixdollar banco.

— with *Germany*, by the rixdollar at so many per cent.

Qu. 1. How much current money of Hamburgh in *f.* 1232 Polish, exchange 121, agio 19?

2. How much current money of Holland in *f.* 1473 Polish, ex. 312, agio $2\frac{1}{2}$?

3. How much Polish money in *f.* 7123 current of Holland, ex. 320, agio $3\frac{1}{2}$?

4. Required the value of *f.* 7846 Polish drawn on Holland, ex. 315, and from Holland on London, exchange 35:9? also the value of the same drawn on Hamburgh, ex. 125, and from Hamburgh on London, ex. 34? the difference in favour of the cheapest method of negociation? and the value of the Polish florin by both methods?

§ 34. *Riga, Revel, Narva, &c.* Accompts are kept in rixdollars albertus, and grofs.

1 florin = 30 grofs

1 rixdollar albertus = 90 grofs, or 3 florins.

The value of the rixdollar is about 4s. 9d.; but exchange is generally transacted by the way of Holland or Hamburgh, and is computed, by allowing from 90 to 96 rixdollars albertus per 100 rixdollars of these places.

Qu. 1. What is the value of *R.* 2478 albertus, drawn on Holland at 6 per cent. loss to the drawer*, exchange from Holland on London 35 s. 8d. commission there $\frac{1}{2}$ per cent.?

2. How many rixdollars albertus in *f.* 1325, drawn from Holland, at 3 per cent. gain to the drawer?

3. A merchant remits *L.* 120 to Holland, exchange 35 s. 2d. and his agent, retaining $\frac{1}{2}$ per cent. commission, remits the value to Riga, at 4 per cent. loss to the remitter: At what rate per rixdollar albertus must the merchant draw on Riga, so as to gain 2 per cent.?

4. P. R. of Riga may draw on A. H. of Amsterdam for the value of 1357 rixdollars albertus, at 8 per cent. loss to the drawer, and A. H. will draw on N. O. London for the value, including $\frac{1}{2}$ per cent. commission, exchange 35 s. 8d. or P. R. may draw on J. S. Hamburgh, at 4 per cent. loss to the drawer, in which case, J. S. will draw on N. O. London, including commission as above, ex. 34:9. Required the amount paid in London both ways?

§ 35. *RUSSIA. Petersburg, Moscow, Archangel, &c.* Accompts are kept in roubles and copecs.

1 rouble = 100 copecs.

Exchange with Britain, so many pence per rouble, par 4 s. 6 d.

——— with Holland, about 50 stivers per rouble.

——— with Hamburgh, about 110 copecs per rixdollar lubs.

Qu.

* If a merchant draw for 100 rixdollars of Holland, and receive only 94 rixdollars albertus for his bill, the exchange is said (though improperly) to be 6 per cent. loss to the drawer. In like manner, the exchange from Holland to Riga is said to be so many per cent. gain to the drawer, or loss to the remitter.

Qu. 1. What is the value of 1738 roubles drawn on London, exchange 4s. $5\frac{1}{4}$ d.?

2. ——— of the same drawn on Holland, ex. 48, and from Holland on London, ex. 35 s. 2 d.?

3. ——— of the same drawn on Hamburgh, ex. 108, and from Hamburgh on London, ex. 34s. 6d.?

4. How many roubles in *f.* 1732, ex. 49?

FRANCE. *Paris, Marseilles, Bourdeaux, &c.* Accompts are kept in livres, sols, and deniers tournois.

1 livre, or franc	= 20 sols
1 sol	= 12 deniers
1 louis d'or	= 24 livres
1 ecu, or crown of exchange	= 3 livres
1 double crown	= 6 livres

Exchange with Britain on the crown, from 28 to 34 d. par $29\frac{1}{4}$ d.

——— with Holland at Paris, about 28 stivers banco per crown.

——— at Bourdeaux, about 56 pence gros per crown.

——— with Hamburgh, about 26 schillings lubs per crown.

Ex. What is the value of *lrs.* 14578 banco, exchange $32\frac{1}{2}$?

14578	Here we first compute the value of 14578
$32\frac{1}{2}$	crowns at the proposed rate in pence: Then
—————	we divide that value by 3, which gives the
29156	value of a like number of livres: Lastly, We
43734	reduce the same to pounds. If the rate or num-
—————	ber of livres had been measured by 3, we might
466496	have computed on the value of the livre, or on
7289	the number of crowns.
—————	
3)473785	
12)157928 $\frac{1}{2}$	
20) 13160:8 $\frac{1}{2}$	
L.658.—8 $\frac{1}{2}$	

Qu. 1. What is the value of *lrs.* 1036:5, exchange $30\frac{1}{4}$ d.?

2. How many livres in L. 5672, exchange $32\frac{1}{4}$ d.?

3. How much cur. money of Holland in *lrs.* 1000, ex. $27\frac{1}{4}$, agio $3\frac{1}{2}$?

4. How many livres in 1180 marcs lubs, ex. $26\frac{1}{4}$, agio 18?

§ 37. PORTUGAL. *Lisbon, Oporto, &c.* Accompts are kept in milrees and rees.

1 milree	= 1000 rees
1 testoon	= 100 rees
1 crusado of exchange	= 400 rees
1 new crusado	= 480 rees
1 moidore	= 4800 rees
1 Joannes	= 6400 rees

Exchange with Britain 65 to 70d. per milree, par $67\frac{1}{2}$ d.

——— with Holland, about 50d. gros per crusado.

Exchange with Hamburgh, about 48d. gros per crusado.

———— with France, about 430 rees per crown.

Qu. 1. How much Portuguese money in L. 130 : 10s. ex. 68 d. ?

2. How much French money in 137 0 420, ex. 428 ?

3. How much Dutch money in 7863 milrees, ex. 49, agio $3\frac{1}{2}$?

4. A person brings home 1200 moidores to Britain, where they are current at 27s. when the exchange is 5s. 7d. How much will he gain or lose ?

§ 38. SPAIN. *Madrid, Cadiz, Seville, &c.* The monies of Spain are distinguished into vellon and old plate; the latter is more valuable, and bears to the former the proportion of 32 to 17.

Accompts are kept in rials and marvedies. Shopkeepers reckon by vellon, and foreign dealers by plate-money, in which bills of exchange are always transacted.

1 rial vellon	= 34 marvedies vellon
1 rial plate	= 34 marv. plate = 64 marv. vellon
1 quart	= 16 marvedies vellon
1 <i>piastre of exchange</i>	= 8 rials plate
1 dollar	= 10 rials plate
1 ducat	= 375 marv. or 11 rials, 1 mar. plate
1 <i>pistole of exchange</i>	= 4 piastrres
1 pistole	= $4\frac{1}{2}$ piastrres

In *Catalonia* and *Valentia*, accompts are sometimes kept in pounds, schillings, and pence Catalan. $3\frac{1}{2}$ schillings Catalan. make a rial plate.

Exchange with London, 40 to 45 d. per piastre, par 43 d.

———— with Holland, about 110 d. gros per ducat.

———— with Hamburgh, about 100 d. gros per ducat.

———— with France, about 18 livres per pistole.

———— with Portugal, about 630 rees per piastre.

———— with Italy, at so many marvedies per their pezzo, ducat, or crown.

Ex. 1. What is the value of 1632 rials vellon, exchange 43 d. ?

$$32 : 17 :: 1632$$

17

11424

1632

32)27744(867 rials plate.

$\frac{1}{8} = 108.375$ piastrres.

43 exchange.

12)4660.125 pence.

20) 388 : $5\frac{1}{8}$

L.19 : 8 : $5\frac{1}{8}$

Here

Here we first reduce 1632 rials vellon to 867 rials plate, by the constant proportion $32 : 17$: Then we reduce these to piaſtres, by dividing by 8, extending either quotient, when neceſſary, to a decimal : Then we multiply the piaſtres by the rate of exchange, which gives the value in pence, and theſe are reduced by diſiſion to pounds.

The learner will perceive, that this operation conſtantly requires a multiplication by 17, and ſucceſſive diſiſions by 32, 8, 12, and 20. The only variable part is the multiplication by 43, which number changes along with the courſe of exchange. We ſhall obtain the ſame anſwer, if, after multiplying by 17, and the rate of exchange, we divide the product by 61440, which is equal to $32 \times 8 \times 12 \times 20$, as was ſhown, Part I. § 73. Or, if we multiply by the rate of exchange, and divide the product by $3614 = \frac{61438}{17}$ it will give the anſwer very nearly. The practitioner may, in like manner, compute multipliers or diſiſors for completing the operations at once, in other caſes naturally complex.

Ex. 2. How much Hamburgh money banco in $r. 4268 : 13$ plate, exchange 106 ?

$$\begin{array}{r} 4268.13 \\ 34 \\ \hline 375)145125(387 \text{ ducats.} \\ 53 \\ \hline \text{marcs ſch.} \\ 16)20511(1281 : 15 \text{ lubs.} \end{array}$$

Here we firſt reduce the rials to marvedies, by multiplying by 34 : Then we reduce the marvedies to ducats, by dividing by 375 : Then, becauſe the rate of exchange, 106 pence groſs, is equal to 53 ſchillings lubs, we multiply the ducats by 53, and the product is the value in ſchillings lubs : Laſtly, we divide theſe by 16, and the quotient is the value in marcs lubs.

- Qu. 1. What is the value of 3782 rials vellon, ex. 41 d. ?
 2. How many rials vellon in L. 1355, ex. $40\frac{1}{4}$?
 3. How many current guilders of Holland in 3795 rials plate, ex. 108, agio 3 ?
 4. How much French money in 3892 rials plate, ex. livres 17 : 15 per piſtole ?
 5. How much money of Portugal in the ſame ſum, ex. 635 ?
 6. How many rials plate in $f. 1705$ banco, ex. 110 ?
 7. What is the value of L. 1000 Catalan. ex. 42 ?

§ 39. ITALY. *Venice*. Money is diſtinguiſhed at Amſterdam, into banco and current. The former has a regular ſuperiority in value of 20 per cent. and alſo a variable agio.

1 ſoldo

1 foldo	= 12 picoli
1 grofs	= $5\frac{1}{2}$ foldi
1 lire	= 20 foldi
1 ducat current	= $6\frac{1}{2}$ lires or 124 foldi = 24 groffi

Accompts are generally kept in lires, foldi, and picoli current; sometimes in ducats current. Bills of exchange are tranfacted by the ducat banco, which is sometimes divided into 24 groffi, sometimes into 20 *foldi* of exchange, and these subdivided into 12 *denari* of exchange.

Exchange with Britain,	about 50 $\frac{1}{4}$ d. per ducat banco.
———— with Holland,	about 93 d. Flemish per ditto.
———— with Hamburgh,	about 89 d. Flemish per ditto.
———— with France,	about 100 sols Tournois per ditto.
———— with Portugal,	about 744 rees per ditto.
———— with Spain,	about 318 marvedies per ditto.

§ 40. GENOA. Accompts are kept in lires, foldi, and denari.

1 foldo	= 12 denari
1 lire	= 20 foldi
1 croifade	= 5 lires
1 pezzo of exchange	= $5\frac{1}{2}$ lires, value 4s. 2d.
1 crown	= 9 lires
1 pistole	= 20 lires

Exchange is tranfacted by the pezzo, which is divided into 20 foldi of exchange, and these into 12 denari. The exchange money is therefore $5\frac{1}{2}$ times more valuable than the current or lire money. The same division of the lire, and also of the exchange money, is used in other places of Italy, which we notice once for all, to avoid repetition.

Exchange with Britain,	about 50 d. per pezzo.
———— with Holland,	about 98 d. Flemish per ditto.
———— with France,	about 108 sols Tournois per ditto.
———— with Portugal,	about 800 rees per ditto.
———— with Spain,	about 342 marvedies per ditto.

§ 41. MILAN. Parma, Modena, &c. Accompts are kept in lires, foldi, and denari.

1 ducat of exchange	= 117 foldi, value 4s. 3d.
1 pistole	= 22 lires

Exchange with Britain,	about 51 d. per ducat.
———— with Holland,	about 100 d. Flemish per ditto.
———— with Spain,	about 348 marvedies per ditto.
———— with Portugal,	about 816 rees per ditto.
———— with France,	about 62 foldi per crown Tournois.

§ 42. TUSCANY. Florence. Accompts are kept in lires, foldi, and denari.

1 ducat

1 ducat = $7\frac{1}{2}$ lires, value 5s. 2 $\frac{1}{2}$ d.

1 piaftre = 6 lires, value 4s. 2d.

1 pistole = 22 lires

Exchange with France, about 45 ducats of Florence for 100 crowns Tournois.

———— with Britain, Holland, Spain, and Portugal, by the ducat, in the same manner as at Venice, &c.

———— at Leghorn, with Britain, &c. by the piaftre.

§ 43. POPE'S TERRITORIES. Accompts are kept in crowns and julios.

1 julio = 10 bayocs

1 dollar = $8\frac{1}{2}$ julios, value 4s. 3d.

1 current crown = 10 julios

1 stamped crown = 12 julios, value 6s.

1 pistole = 31 julios

At Rome, *Civita Vecchia*, *Ancona*, &c. exchange is transacted, as at Venice, on the stamped crown.

At *Bologna* and *Ravenna*, on the dollar.

§ 44. NAPLES. Accompts are kept in ducats, tarins, and grains.

1 tarin = 20 grains

1 ducat = 5 tarins, value 3s. 4d.

Exchange with France, about 72 ducats, per 100 crowns Tournois.

———— with Britain, Holland, Spain, and Portugal, by the ducat, as at Venice.

§ 45. SICILY. *Palermo*, *Messina*, &c. Accompts are kept in ounces, tarins, and grains.

1 grain = 6 pichilli

1 ponti = 8 pichilli

1 tarin = 20 grains

1 ducat = 13 tarins, value 3s. 4d.

1 ounce = 30 tarins

Exchange with Naples, about 195 ponti per ducat of Naples.

———— with other places, by the ducat, as at Naples.

§ 46. SARDINIAN DOMINIONS. *Turin*, *Chamberry*, *Cagliari*, &c. Accompts are kept in lires, foldi, and denari.

1 florin = 12 foldi

1 fcudi = 6 florins, value 4s. 6d.

1 pistole = 13 lires

Exchange with France, about 92 $\frac{1}{2}$ foldi per crown Tournois.

———— with other places, by the fcudi.

Exchange from one place in Italy to another is generally transacted.

acted by reducing the crowns, ducats, or pezzos, to each other, at a certain allowance per cent.

Sometimes, by allowing so many foldi of one place for the crown or ducat of another.

Qu. 1. How much Sterling money in 3756 liras of Leghorn, ex. 51 d?

2. How much in 427½ liras of Florence, ex. 62 d?

3. How much in 936 current crowns of Rome, ex. 71 d?

4. How much in 463 ducats 2 tarins of Naples, ex. 39½ d?

5. How much in 1000 liras of Turin, ex. 53 d?

6. How much Sicilian money in L. 312, ex. 18. 7d. per florin?

7. How many liras of Milan in L. 326, ex. 50 d?

8. How much money of Holland in 1260 ducats banco of Venice, ex. 92 d?

9. How much money of Hamburg in 1240 liras current of Venice, ex. 91, agio at Hamburg, 15, at Venice 25?

10. How much Venetian money in f. 1270 current of Holland, agio there 3½, ex. 96, agio at Venice 25?

11. How much Spanish money in 1230 ducats of Venice, ex. 315?

12. How much Venetian money in 176 milrees, ex. 756?

13. How much Portuguese money in 1345 pezzos of Genoa, ex. 842?

14. How much Spanish money in 1392 liras of Genoa, ex. 360?

15. How much Florence money in 1260 rials plate of Spain, ex. 428?

16. How much money of Naples in 1365 livres Tournois, ex. 73?

17. How much French money in 7360 liras of Florence, ex. 45?

18. How many ducats banco of Venice in 1362 current crowns of Rome, ex. 65 stamped crowns per 100 ducats?

19. How much Genoese money in 365 ducats of Naples, ex. 86 foldi of Genoa per ducat of Naples?

20. How many current crowns of Rome in 1345 ducats of Naples, ex. 64 stamped crowns per 100 ducats?

§ 47. IRELAND. Accompts are kept in pounds, shillings, and pence Irish, which are inferior to Sterling. Their real coins of gold and silver are the same as the British, but they have halfpennies and farthings of their own.

A shilling Sterling is 13d. currency; consequently L. 1 Sterling = L. 1 : 1 : 8 currency, and a guinea passes for L. 1 : 2 : 9. The value of L. 100 Sterling at par is L. 108 : 6 : 8 Irish. The course of exchange varies from 6 to 12 per cent.

§ 48. NORTH AMERICA, WEST INDIES. There is some of the British money in circulation in the United States and British colonies;

colonies; but Spanish and Portuguese money is more common, especially in the West Indies. The quantity of these being still insufficient, paper currency has been substituted in place of real money, and accounts are kept in pounds, shillings, and pence currency, whose value is very fluctuating, but always inferior to Sterling. In our West Indian islands, the exchange is about L. 130 currency for L. 100 Sterling.

The current rate of coins at Jamaica is as follows: A rial passes for $7\frac{1}{2}$ d. a dollar 6 s. 3 d. a pistole L. 1 : 4 s. a moidore L. 1 : 18 : 9, a Joannes L. 2 : 10 s. a guinea 30 s.

§ 49. In many places of Britain, bills on London, if payable at sight, or at a short date, are negotiated at a premium, which seldom rises so high as 2 per cent. Bills at a long date pass at par, or at a discount.

Qu. 1. How much Irish money in L. 1286 : 10 s. Sterling, ex. $7\frac{1}{2}$ per cent.?

2. How much Sterling money in L. 372 Irish, ex. $9\frac{1}{4}$ per cent.?

3. How much Sterling money in L. 769 : 10 s. currency of New York, ex. 53 per cent.?

4. How much currency of Barbadoes in L. 1240 Sterling, ex. 30 per cent.?

5. A merchant in London draws L. 3000 on Dublin, ex. at par, and remits for the same, when the exchange is at $10\frac{1}{4}$ per cent. Required his gain or loss?

§ 50. TURKEY. 1 asper = about $\frac{1}{4}$ of 1 d. 1 solata = 20 aspers. 1 *piastre* = 80 aspers. 1 *xeriff* = 200 aspers.

ARABIA. 80 caveers = 1 dollar, value 4 s. 6 d. 4 caveers = 3 comashes. 100 comashes = 1 sequin, value 7 s. 6 d. 9 sequins = 1 *tomond*.

PERSIA. 10 coz = 1 shahie, value 4 d. 2 shahies = 1 mamooda. 4 shahies = 1 abashee. 50 abashees = 1 *tomond*, value L. 3 : 6 : 8.

MOROCCO. 24 fluces = 1 blanquil, value 2 d. 4 blanquils = 1 ounce. 54 blanquils = 1 xequin, value 9 s.

EAST INDIES. *Madras*. 8 pices = 1 fanam. 10 fanams = 1 rupee, value 2 s. 6 d. 36 fanams = 1 pagoda, value 8 s. 9 d. 4 pagodas = 1 gold rupee.

The rupee is the same in all the European settlements in India; but it is differently multiplied and divided in different places. A lack of rupees is 100,000. A crore of rupees is 100 lacks.

§ 51. If the courses of exchange were always at par, or corresponding to each other, there would be no advantage in transmitting money through different countries, and the direct conveyance would be preferred, because attended with less expence and delay. But the courses are always fluctuating, and are often in such a situation, that money may be drawn or remitted to more advantage,

H h

when

when it passes through several places; of which instances will occur in the solution of the foregoing questions.

Occasion has been taken from this irregularity in the courses of exchange, to carry on a circulation of payments, by means of bills of exchange, through different places. This business, when well understood, often yields considerable profit, and it is useful to commerce in general, because it tends to reduce the course of exchange to a regular and equal standard.

In order to carry on this business, we must compute the rate of exchange which should prevail between two places, corresponding to the rates between these places and a third. For example, if the exchange from London to Amsterdam be 35 s. Flemish per pound Sterling, and the exchange from Paris to Amsterdam be $52\frac{1}{2}$ d. Flemish per crown Tournois; then, as the Flemish money which is equal to a pound Sterling, is to the Flemish money which is equal to a French crown, so is **L. 1** to the corresponding rate of the crown. That is,

s. Fl. d. Fl. L.

35 : $52\frac{1}{2}$:: 1 :

halfpence Fl. 840 : 105 :: 240 : 30 d. Sterling.

Thus, the value of the French crown, if the money were circulated through Holland, would be 30 d. which is called the *arbitrated value*, or the rate by *arbitration*. Now, if the course of exchange from London to Paris were 30 d. per crown, no gain could be obtained by circulation: But, if the course be higher, suppose 32 d. a dealer in exchange may remit 1000 crowns to Paris, by way of Holland, and draw for it directly, by which he will gain 2 d. per crown. If, on the other hand, the course be lower than the arbitrated value, suppose 28 d. he may remit the money directly to Paris, and draw for it by way of Holland, by which he will also gain 2 d. per crown.

If the exchange from Britain to France had been given 30 d. and to Holland 35 s. the arbitrated rate between France and Holland would have been computed by this proportion.

d Sterling. 240 : 30 :: 840 : 105 halfpence Flemish.

If the exchange from France to Britain had been given 30 d. Sterling, and to Holland $52\frac{1}{2}$ d. Flemish, the arbitrated course between Britain and Holland would have been thus computed.

d. Ster. 30 : 240 :: 105 : 840 halfpence Flemish = 35 s.

Money may be circulated through several places for the same purpose. The method of computing the value is explained, Part I. § 89. This is called compound arbitration.

§ 52. In order to carry on this business with profit, the difference between the real and arbitrated courses of exchange must be sufficient to pay the commission charged by the factors through whose hands the money is circulated, which is generally $\frac{1}{2}$ per cent. to each. This should be allowed at each step of the circulation: Or,

if

if we allow as many commissions on the original sum as there are factors employed in the circulation, we shall obtain an answer with more ease, which differs very little from the true one.

§ 53. We shall only further observe, that if A draw a bill on B, who reimburses himself, when he pays it, by drawing on C, who draws again on A for the value; then A will have the advantage of possessing the money during the time that all the bills are running. On the other hand, if A remit a bill to B, who remits the value, when he receives it, to C, who remits it back in like manner to A; then A will be obliged to advance the money during the time the bills are circulating: And, in computing the profit, the interest must be added or subtracted accordingly.

S E C T. III.

FOREIGN WEIGHTS AND MEASURES.

I. W E I G H T S.

§ 54. **T**ABLE for comparing the pound weight of foreign places with the English pound averdupois, and the pound of Amsterdām.

	Amster. lbs.	Averd. lbs.
100 lb English Troy	= 75 $\frac{1}{2}$	= 87 $\frac{1}{2}$
100 lb English averdupois	= 92	= 100
100 lb of Amsterdām	= 100	= 108 $\frac{1}{2}$
100 lb of Antwerp and Brussels	= 94 $\frac{1}{2}$	= 103
100 lb of Hamburgh	= 98	= 106 $\frac{1}{2}$
100 lb of Leige	= 95	= 103 $\frac{1}{2}$
100 lb of Frankfort and Nuremburgh	= 102	= 110 $\frac{1}{2}$
100 lb of Leipswick, Lubec, and Middleburgh	= 95 $\frac{1}{4}$	= 103 $\frac{1}{4}$
100 lb of Breslaw, Koningsberg, and Avignon	= 80	= 86 $\frac{1}{2}$
100 lb of Geneva	= 112	= 121 $\frac{1}{2}$
100 lb of Denmark	= 98 $\frac{3}{4}$	= 107 $\frac{1}{2}$
100 lb of Norway	= 105	= 114
100 lb of Sweden	= 85 $\frac{1}{2}$	= 92 $\frac{3}{4}$
100 lb of Dantzick, Ghent, and Oudenarde	= 89	= 96 $\frac{1}{2}$
100 lb of Riga	= 82 $\frac{1}{2}$	= 89 $\frac{1}{2}$
100 lb of Russia	= 81 $\frac{1}{4}$	= 88 $\frac{1}{4}$
100 lb of PARIS, Bourdeaux, &c.	= 100	= 108 $\frac{1}{2}$
100 lb of Rouen	= 104	= 113
100 lb of Rochelle	= 101	= 109 $\frac{1}{2}$
100 lb of Lyons	= 86	= 93 $\frac{1}{4}$
100 lb of Tholoufe	= 85	= 92 $\frac{1}{4}$
100 lb of Marseilles	= 81	= 88
100 lb of Seville and Cadiz	= 95	= 103
100 lb of Portugal	= 87 $\frac{1}{2}$	= 95
		100

	Amster. lbs.	Averd. lbs.
100 lb of Rome	= 72 $\frac{1}{2}$	= 78 $\frac{1}{2}$
100 lb of Genoa	= 66 $\frac{2}{3}$	= 72 $\frac{1}{2}$
100 lb of Venice and Milan	= 60	= 65
100 lb of Turin	= 66	= 71 $\frac{3}{4}$
100 lb of Leghorn	= 69	= 75
100 lb of Naples	= 59	= 64
100 lb of Constantinople	= 114	= 123 $\frac{3}{4}$

In HOLLAND, 8 lb. = 1 stone, 15 lb. = 1 lispound, 20 lispounds = 1 shippound, 400 lb. = 1 load.

In DENMARK, 16 lb. = 1 lispound, 20 lispounds = 1 shippound.

In SWEDEN, a shippound for flax, hemp, and fish = 400 lb. for iron 320 lb.

In POLAND, an ordinary stone = 16 lb.; a spruce stone = 34 lb.; a centner = 120 lb.; a shippound = 320 lb.; a last = 2560 lb.; a great last = 1 $\frac{1}{2}$ common lasts.

In LIVONIA, 20 lb. = 1 lispound, 20 lispounds = 1 shippound.

In RUSSIA, 40 lb. = 1 pood, 10 poods = 1 birquet, 6 birquets = 1 last; a bobbin flax weighs about 3 poods.

At HAMBURGH, 14 lb. = 1 lispound, 8 lispounds = 1 centner, 20 lispounds = 1 shippound, 10 lb. = 1 small stone for wool, &c. and 20 lb. = 1 great stone for flax.

In PORTUGAL, 32 lb. = 1 arab, 4 arabs = 1 quintal.

In SPAIN, 26 lb. = 1 arab, 4 arabs = 1 quintal.

II. LONG MEASURE.

§ 55. Table for comparing the yards, and other lineal measures of foreign places, with the English yard.

	Yards.
100 ells English	= 125
100 aunes of Holland, each 2 $\frac{1}{2}$ feet of Holland	= 75
100 — of Brussels, each 2 $\frac{1}{2}$ feet of Brussels	= 76 $\frac{1}{2}$
100 — of Bruges	= 75 $\frac{1}{2}$
100 — of Antwerp	= 68 $\frac{1}{4}$
100 — of Denmark, each 2 feet of Denmark	= 69
100 — of Sweden, each 2 feet of Sweden	= 75
100 — of Dantzick	= 66 $\frac{2}{3}$
100 — of Hamburgh, Frankfort, and Leipswick	= 62 $\frac{1}{2}$
100 artheens of Russia	= 25 $\frac{1}{4}$
100 aunes of Lubec	= 57
100 — of Nuremburgh	= 78 $\frac{1}{2}$
100 — of Breslaw	= 60
100 — of Geneva	= 124 $\frac{1}{4}$
100 — of Bern and Basil	= 62 $\frac{1}{2}$
100 — of PARIS, Bourdeaux, Rochelle, and Rouen	= 128 $\frac{1}{4}$
	100

	Yards.
100 canes of Lyons and Marfeilles	= 214 $\frac{1}{2}$
100 — of Tholouse and Montpellier	= 200
100 — of Rome	= 227 $\frac{1}{2}$
100 — of Genoa	= 245 $\frac{1}{2}$
100 braffes of Venice	= 73 $\frac{1}{2}$
100 — of Florence and Leghorn	= 64
100 — of Milan	= 58 $\frac{1}{2}$
100 — of Rome, used by merchants	= 95 $\frac{1}{2}$
100 — of ditto used by architects	= 85 $\frac{1}{2}$
100 — of Bergamo	= 71 $\frac{1}{2}$
100 varas of Spain, each 4 palms of Spain	= 93 $\frac{1}{2}$
100 — of Portugal	= 123
100 cavidos of Portugal	= 75
100 arifhes of Persia	= 106 $\frac{1}{2}$
100 pikes of Constantinople short measure	= 71 $\frac{1}{2}$
100 — of ditto, long measure	= 77 $\frac{1}{2}$

	feet dec.
100 feet of Dantzick	= 94. 2
100 — of Denmark	= 103. 9
100 — of Sweden	= 97. 4
100 — of Bruffels	= 90. 2
100 — of Lyons	= 112. 15
100 — of Milan	= 130. 3
100 — of Paris	= 106. 2
100 palms of Naples	= 86.
100 — of Rome, used by merchants	= 81. 6
100 — of ditto, used by architects	= 73. 2

The French arpent consists of 100 perches, whereof each is a square of 18 feet Paris measure; it therefore contains 32400 square Paris feet, and is equal to 2 $\frac{2}{3}$ Scots roods, or to 3.37 English roods. According to the *measure royal*, the perch is a square of 22 feet, and the arpent is about 1 $\frac{1}{4}$ English acres.

Itinerary measures.

A French league	is about 2 $\frac{1}{2}$ English miles
A German mile	4 ditto
A Dutch mile	3 $\frac{1}{2}$ ditto
An Italian mile	$\frac{1}{2}$ ditto
A Spanish league	3 $\frac{1}{2}$ ditto
A Russian verit	$\frac{1}{2}$ ditto

III. CORN MEASURE.

§ 56. The most general corn measure is the last, which is different, and variously divided in different places.

The last of Amsterdam is equal to 10 $\frac{1}{2}$ English quarters, or 82 Win-

Winchester bushels, or about 81 Linlithgow wheat firlots, or 57 barley firlots. A last wheat should weigh about 4500 lb. It is divided into 27 muids, of 4 schepels each, or into 36 sacks of 3 schepels.

In France the muid is the most general measure, and is divided into 12 sextiers; the sextier into 12 bushels.

19 sextiers at Paris = 1 last of Amsterdam.

§ 57. IV. ANCIENT MONIES, WEIGHTS, AND MEASURES.

Attic money.

	L.	s.	d.
1 Attic drachm	= 0	: 0	: 7½
100 drachms = 1 mina	3	: 2	: 6
60 minas = 1 talent	187	: 10	: 0

The Jewish talent was equal to 2 Attic talents, and contained 3000 shekels; each shekel = 2 didrachms or 4 drachms. The Alexandrian talent was equal to the Jewish. The Babylonish talent contained 7000 drachms, and was therefore $\frac{1}{2}$ greater than the Attic talent. The talent of gold contained the same weight as the talent of silver.

Roman Weights.

Divisions of 1 *As*.

4 grana	= 1 filiqua	2 uncia	= 1 sextans
3 filiqua	= 1 obulus	3 ditto	= 1 quadrans
2 oboli	= 1 scrupulum	4 ditto	= 1 triens
3 scrupuli	= 1 drachma	5 ditto	= 1 quincunx
8 drachma	= 1 uncia	6 ditto	= 1 semis
12 uncia	= 1 as or libra	7 ditto	= 1 septunx
		8 ditto	= 1 bes
		9 ditto	= 1 dodrans
		10 ditto	= 1 dextans
		11 ditto	= 1 denunx

The Roman pound contained 5256 grains, and was therefore about $\frac{1}{12}$ less than the pound Troy.

Roman Monies.

The most ancient coins among the Romans were of brass. The *as* originally consisted of a pound of brass, but was afterwards reduced to half an ounce; but the foregoing division into 12 parts was still retained.

The chief silver coin was the *denarius*, or Roman penny, 96 of which made a *libra* or *pondo*. If we value the *libra* at L. 3, (as is commonly done, though too high), the *denarius* is equal to $7\frac{1}{2}$ d. and the *as* to $\frac{1}{2}$ d. The proportion of the value of silver to brass was 40 to 1. The proportion of the value of gold to silver

was

was originally 10 to 1, but in the time of the latter empire became 14 to 1.

Brass Coins.

1 as	= $\frac{3}{4}$ d.
1 semis	= $\frac{1}{2}$ as, &c.
1 uncia	= $\frac{1}{12}$ as
1 semiuncia	= $\frac{1}{24}$ as
1 sextula	= $\frac{1}{96}$ as
decussis	= 10 asses
1 sestertium [neut. gen.]	= 1000 sestertii
1 talent	= 24 sestertia

Silver Coins.

1 denarius	= 10 asses = $7\frac{1}{2}$ d.
1 victoriat	= $\frac{1}{2}$ denarius
1 sestertius	= $\frac{1}{4}$ denarius
1 obolus	= $\frac{1}{8}$ denarius
1 libella	= $\frac{1}{10}$ denarius
viceffis	= 20 asses
centuffis	= 100 asses
L. 7 : 16 : 3	

One pound gold was originally divided into 48 *aurei*, and afterwards into 72. Large sums are usually expressed in pounds of gold, the value of which is L. 40 nearly.

Roman Measures of Capacity.

4 cochlearii	= 1 cyathus
12 cyathi	= 1 sextarius
6 sextarii	= 1 congius
16 sextarii	= 1 modius
4 congi	= 1 urna
2 urnæ	= 1 amphora
2 amphora	= 1 medimnus
10 medimnæ	= 1 culeus

Roman Long Measure.

4 digiti	= 1 palmus
3 palmi	= 1 spithama
4 palmi	= 1 pes
6 palmi	= 1 cubitus
$2\frac{1}{2}$ pedes	= 1 passus simplex
5 pedes	= 1 passus duplex
125 passi	= 1 stadium
8 stadii	= 1 milliæ

The Roman foot = 11.632 inches.

The *actus quadratus* was a square of 120 Roman feet; the *jugerum* was equal to two of these, and is to the English acre as 10 to 16.097.

The *amphora* was a cubical Roman foot, and contained 80 Roman pounds of water. It was nearly equal to $\frac{1}{2}\frac{8}{7}$ of an English bushel. The *sextarius* contained about $52\frac{1}{2}$ cubical English inches; and therefore was greater than the wine pint, but less than the ale pint. It was subdivided in the same manner as the *as*.

§ 58. MISCELLANEOUS EXERCISES.

I. A merchant imports from Amsterdam to Leith 325 lasts oats; prime cost *f.* 3 : 2 per muid; commission 2 per cent. and other charges $\frac{1}{2}$ per cent.; freight 22 s. per last; charges at landing and during sale L. 13 : 7s.; short measure 2 per cent.; exchange from Edinburgh to London, and commission there, 1 per cent.; exchange from London to Amsterdam 35s. 10 d.; agio 3 per cent.; price at Leith 12s. 6d. per boll. Required the gain or loss?

II. J. Winenburgh of Hamburgh has shipped, per the *Industry*, Nairn, for accompt of William Davidson, Leith, 130 lasts oats, Hamburgh measure, = $\frac{1}{2}\frac{1}{7}$ of the last of Amsterdam, at M. 9:87 lubs; and 57 lasts wheat at M. 150:8; lighterage and charges 14 sch. lubs per last; duty on wheat M. 37:10, and on oats M. 22:10 per last; com. $2\frac{1}{2}$ per cent.; insurance at Hamburgh on the amount of

of the invoice, 2 per cent.; commission on ditto $\frac{1}{4}$ per cent.; freight 1 guinea per last.

J. Winenburgh may draw on A. Kempen of Amsterdam 6 wdt. agio $12\frac{1}{2}$, ex. $33\frac{1}{2}$; in which case Kempen will draw on G. Reynolds, London, 2 ufa. exchange 35s. 7d. including his commission, $\frac{1}{4}$ per cent.; or Winenburgh may draw immediately on Reynolds, 2 ufa. exchange 34s. 2d.; agio as before; commission to G. Reynolds $\frac{1}{4}$ per cent. Required which is preferable? also the cost of the wheat and oats per boll? and a copy of the invoice and bills?

III. A merchant imports from Petersburg to Britain 725 poods iron; prime cost Ro. 1:12 per pood; charges $14\frac{1}{2}$ per cent.; exchange $53\frac{1}{2}$; freight L. 1:15s. per ton; duty L. 2:8:6 per ditto; charges in Britain 5 per cent. Required the whole cost, the averdupois weight, and the cost per cwt.?

IV. Required the value of 12 shlb. iron, imported from Gottenburgh to Britain, at 472 copper dollars per shlb.; charges $7\frac{1}{2}$ per cent. drawn on London, exchange 50? Also the value drawn on Holland, exchange 15; and from Holland on London, exchange 35s. 7d.? Also the averdupois weight, and value per cwt.?

V. Required the cost of one dozen Madeira wine, at 115 melrees per pipe; charges at Madeira 5 per cent; exchange 5s. 6d.; freight L. 2 per ton; duty L. 29:13:9d. per ton; charges at home 12s. supposing the pipe to run 49 dozen; bottles and corks 2s. 3d. per dozen?

VI. A merchant exports 1000 quarters wheat to Madeira, bought for 35s. per quarter, and receives a debenture for the bounty at 5s. per quarter, which he sells at 7 per cent. discount; charges at shipping, 9d. per quarter; freight 22s. per ton of 5 quarters; insurance on the covered property 5 per cent.; to pay 98 per cent. in case of loss. It is sold for 800 rees per alquier, whereof $9\frac{1}{2}$ make a quarter; charges 70 rees per alquier; commission $2\frac{1}{2}$ per cent. He may have returns in bills of exchange at 5s. 6d. per milree; or, in Madeira wine; price and charges there as in last question; and the odd money remitted at 5s. 6d.; insurance home the same as the insurance outward; price in Britain L. 54 per pipe. Required the gain or loss by both methods?

VII. A merchant imports from Riga 100 shlb. flax, at R. 22; and 100 shlb. hemp, at R. 12; commission and charges 5 per cent.; insurance on the outset value 4 gs. per cent.; freight 45s. per ton; charges at shipping 8s. per ton; price of flax in Britain L. 45, and of hemp L. 28 per ton; exchange from Riga to Holland 5 per cent. loss to the drawer; commiss. in Holland $\frac{1}{2}$; and exchange from Holland to London 35s. 6d. Required the gain or loss?

VIII. A merchant sends to St Christophers 300 barrels herrings, at 21s. per barrel; freight 5s.; bounty 2s. 6d.; charges at shipping 4d. per barrel; insurance on the outset charge 5 gs. per cent.

cent, or 10 gs. out and home. The cargo is sold for 51s. currency; commission and storage 8 per cent.; insurance of debts 3 per cent.; wharfage, and other charges, 1 s. 9 d. per barrel. The value may be returned in bills of exchange, at L. 160 currency per L. 100 Sterling, or in sugar, at L. 53 currency per ton; charges there 10 per cent.; and the sugar will sell in Britain at L. 45 per ton; freight and charges in Britain L. 5 : 10s. per ton. Required the gain or loss arising from both these ways of drawing the return?

IX. A cargo of 320 barrels salmon is bought at 48 s. for exportation; charges at shipping 1 s. 5 d. per barrel; bounty 4s. 6d. per ditto. It may be sent to Rotterdam, freight 3s. 6d. per barrel; insurance on the covered property 2 gs.; where they will sell for f. 32 per barrel; charges there f. 2.17 per barrel; commission $2\frac{1}{2}$ per cent.; exchange 22 d. per f.: Or to Dunkirk, freight 4 s.; insurance $2\frac{1}{2}$ gs.; price lrs. 85 per barrel; charges there lrs. 9.12 per barrel; commission 3 per cent.; exchange 28 d. Required the gain or loss at both places?

X. A merchant has on hand 15 hds. tobacco imported from Virginia, qt. each 7 cwt.; prime cost there $3\frac{1}{2}$ d. per lb.; freight 15s. per hd. It may be sold in Britain at 10 d. per lb.; on paying the duty $5\frac{1}{2}$ d. per lb. Or, it may be sent to France, where it will sell for 17 sols per lb. of Paris; duty and charges there 8 sols per lb.; freight 5s. per hd.; exchange 29 d.; insurance 3 per cent. on the outset. Or, to Holland, where it will sell for 8 stivers per lb. of Amsterdam; duty and charges there $3\frac{1}{4}$ stivers; freight 5s. 6d. per hd.; insurance $3\frac{1}{4}$ per cent.;agio $3\frac{1}{2}$ per cent.; exchange 35 s. 10 d. Or, to Lisbon, where it will sell for 142 rees per lb. of Lisbon; charges there 90 rees per lb.; freight 7s. per hd.; insurance 4 per cent.; exchange 5 s. 7 d. Required the gain or loss at each place?

§ 59. As a specimen of the manner that the student should follow in solving these exercises, we shall subjoin the arrangement and solution of the first.

The computations are regulated by the methods explained, and the proportions given in this and the former section. The arrangement must be adjusted, by attending to the connection of the parts of the question. The only general rule we can give, is to distinguish the articles valued in British and foreign money, or of different kinds of foreign money, and complete the computation and reduction of the one, before we begin to the other.

325 lafts oats, bought at Amsterdam,			
at f. 3 : 2 per muid,		f. 27202 : 10	
Commillion and charges, 2½ per cent.		680 : 1	
		f. 27882 : 11	
f. 27070 : 9 banco, ex. on London			
35s. 10d.		L. 2518 : 3 : 7	
Agio 3 per cent.	812 : 2		
	27882 : 11		
Exchange to London, and commillion at 1 per cent.	25 : 3 : 7		
Freight on 325 lafts, at 22s.	-	357 : 10 : —	
Charges	- - - -	13 : 7 : —	
	B. F. P.	L. 2914 : 4 : 2	
325 lafts, at 57 firlots each, is	4631 : 1 : —		
Short meafure, 2 per cent.	92 : 2 : 2		
Bolls	4538 : 2 : 2 at 12s. 6d.	2836 : 12 : 9	
	Lofs	L. 77 : 11 : 5	

C H A P. III.

MERCHANTS ACCOMPTS.

§ 60. **W**E are to explain in this chapter the form and method of composing accompts of various kinds which merchants have occasion to use.

A **BILL OF PARCELS** is a note of quantity and value of goods fold, which is delivered to the purchafer, along with the goods, in the following form :

London, 12th October 1774.

MR WILLIAM BULLER,

Bought of Joseph Arnold,

2 ps. 20 yds. each, is	40 yds. blue moreen, at 2s.	9d.	L. 5 : 10 : —
3 24	72 green ditto,	2s. 7d.	9 : 6 : —
2 25	50 crimfon ditto,	2s. 10d.	7 : 1 : 8
7	162		L. 21 : 17 : 8

§ 61. An accompt of goods formerly fold is drawn out nearly in the fame form. If a partial payment be made, it is placed under the

the sum of the accompt, and subtraçted. If several partial payments be made, they are collected in an inner column, and their sum is extended and subtraçted. When the accompt is paid, or compensated, or settled by a bill, a receipt is granted at the foot, in which the manner of settling it is narrated. Example,

Mr WILLIAM TRAIL Dr to David Fletcher,

1774.			
June 12.	To 6 dozen red port wine, at 18s.	L. 5 : 8 : —	
15.	To 3 dozen claret, at 32s.	4 : 16 : —	
July 19.	To 4 dozen Madeira, at 35s.	7 : — : —	
	To 1 dozen sherry,	— : 17 : —	

1774.		L. 18 : 1 : —	
July 3.	By cash in part, L. 4 — —		
Sep. 15.	By ditto, 3 — —		
		7 : — : —	

L. 11 : 1 : —

Glasgow, 19th October 1774. Received bill at six months date for the balance, *David Fletcher.*

Sometimes the payments are introduced and subtraçted at the dates, when they occur, and the other articles added afterwards.

I. London, 12th May 1765. David Finch bought of William Powel, 1 piece flowered silk, $36\frac{1}{2}$ yards, at L. 1 : 1 : 6 per yard; 1 piece, $34\frac{1}{2}$ yards, at 19s. 10d.; 1 ditto, $33\frac{1}{2}$ yards, at 18s. 6d.; 2 pieces sattin, $64\frac{1}{2}$ yards, at 17s. 4d.; 1 piece lutestring, $30\frac{1}{2}$ yards, at 7s. 4d.; 2 pieces ditto, 63 yards, at 5s. $6\frac{1}{2}$ d.; 3 pieces ditto, 92 yards, at 4s. $9\frac{1}{2}$ d.; 2 pieces Persian, 48 yards, at 2s. 7d.; 2 pieces ditto, 52 yards, at 2s. $4\frac{1}{2}$ d.

II. Thomas Butler bought of Edward Turner, Sheffield, 19th June 1772, 6 dozen razors, at 1s. $3\frac{1}{2}$ d. per piece; 3 dozen ditto, at 1s.; 1 dozen ditto, at 9d.; 7 dozen knives and forks, at 25s. per dozen; 3 dozen ditto, at 21s.; 2 dozen ditto, at 18s.; 1 dozen ditto, at 12s. 9d.; and the following articles, on the 31st of July 1772, 8 dozen scissars, at 6s. 4d. per dozen; 10 swords, at 27s. each; 5 ditto, at 21s.; and 12 cases lancets, at 13s.; and the accompt was paid 15th September thereafter. Required a copy of the accompt and receipt?

III. Montrose, 12th May 1774. David Williams bought of Samuel Baird and Co. 8 casks nails, qt. each 30 m. at 3s. $2\frac{1}{2}$ d. per m.; 6 ditto, qt. each 32 m. at 2s. 11d.; 4 ditto, qt. each 22 m. at 2s. $7\frac{1}{2}$ d.; 3 ditto, qt. each 28 m. at 2s. $1\frac{1}{2}$ d.; 3 cwt. 2 qrs. 18 lb. small rope, at L. 3 : 17s. per cwt.; 3 cwt. 2 qrs. 12 lb. ditto, at L. 3 : 19s.; and 2 cwt. 2 qrs. at L. 4 : 4s.

IV. London, 14th May 1770. James Gwyn bought of Coney and Co. 3 hds. fugar, qt. No. 1. 13 cwt. 3 qrs. 4 lb. tare 2 qrs. 9 lb.;

lb.; No. 2. 13 cwt. 2 qrs. 15 lb. tare 2 qrs. 19 lb; No. 3. 12 cwt. 3 qrs. 17 lb. tare 2 qrs. 17 lb. at 38 s. per cwt. and the hds. 5s. each; 4 bags coffee, qt. No. 1. 2 cwt. 2 qrs. 7 lb. tare 12 lb.; No. 2. 1 cwt. 3 qrs. 19 lb. tare 14 lb.; No. 3. 2 cwt. 3 qrs. tare 16 lb.; No. 4. 2 cwt. 2 qrs. tare 12 lb. at 1s. 10½d. per lb.; 1 box tea, qt. 3 cwt. 1 qr. 7 lb. at 4 s. 9½d. per lb. box 5s. 4d.; 15 loaves refined fugar, weighing, No. 1. 2 qrs. 7 lb.; No. 2. 2 qrs. 13 lb.; No. 3. 3 qrs. 12 lb.; No. 4. 3 qrs. 2 lb.; No. 5. 2 qrs. 9 lb.; No. 6. 3 qrs. 4 lb.; No. 7. 3 qrs. 1 lb.; No. 8. 3 qrs.; No. 9. 2 qrs. 7 lb.; No. 10. 2 qrs. 9 lb.; No. 11. 2 qrs. 6 lb.; No. 12. 3 qrs. 5 lb.; No. 13. 3 qrs.; No. 14. 2 qrs. 7 lb.; No. 15. 2 qrs. 2 lb.; at 54s. per cwt.

V. Edinburgh, 17th July 1774. William Simson bought of David Greig, 3 dozen deals, 12 feet long, 2 inches thick, at 3 s. 4d. per dozen; 2 dozen 6 deals, 10 feet 1½ inches, at 2 s. 8d.; 4 dozen 4, 10 feet, 1¼ inches, at 2 s. 4d.; 6 fir barks, 16 feet, 16 inches square, at 15 s. 2d. each; 1 piece oak, qt. 18 solid feet, at 1 s. 9d. per foot; 1 piece elm, qt. 14 solid feet, at 1 s. 6d.; 7 dozen staves, at 9½d. per dozen; 6 pieces crooked oak, at 5 s. each; 1 plank plane-tree, 9½ feet, at 1 s. 5d.; carriage L. 3:6:8. And a bill was granted for the value, payable in 3 months.

§ 61. An INVOICE is an accompt of goods sent off, generally by sea, either in consequence of orders from the person to whom they are sent; and at his risk, or consigned to him for sale, at the risk of the proprietor. The form is exhibited in the following page;

It may be observed from this specimen, that the title contains the name of the person who ships the goods, the ship and master, the voyage, the person to whom sent, and on whose risk.

The different articles are distinctly arranged under proper titles; and if the value of the packages be charged, it is added to that of the goods, before extending. The marks on the packages are exhibited on the margin. When all the articles are collected, the invoice is summed, and then the charges at shipping are specified in an inner column, and added to the former sum. Lastly, When there is commission due for purchasing and shipping the goods, it is charged upon the sum of the invoice, including charges, and added to the former sum.

It is common for a factor, when he purchases a cargo on commission, to transmit the several bills of parcels for his employers satisfaction; in which case, it is sufficient to express the sum of each bill in the invoice, and to refer for particulars to the bill itself.

When goods are sent abroad at the risk of the person who ships them, it is not necessary to mention the prices in the invoice; but it is generally done for the factor's instruction in disposing of them.

INVOICE

INVOICE of goods shipped by James Newberry, per the Britannia, Robert Smith master, from London to Leith, for accompt and risk of Mr James Green merchant there.

8 boxes SUGAR.

I. G.		C. qr. lb.		C. qr. lb.
No 1. a 8.	No 1.	3 : 2 : 5	No 5.	4 : 2 : 19
	2.	3 : 1 : 17	6.	4 : 3 : 18
	3.	3 : 3 : 27	7.	3 : 3 : 20
	4.	4 : 2 : 9	8.	5 : 3 : 23

15 : 2 : 2

19 : 1 : 24

19 : 1 : 24

34 : 3 : 26

Tare 10 lb. per box,

2 : 24

34 : 1 : 2 at 35s. L. 59 : 19 : 4

Boxes,

1 : 8 : —

————— L. 61 : 7 : 4

4 chefts TEA.

No 1. a 4.	No 1.	94 lb
	2.	95
	3.	99
	4.	102

390

Tare 7½ lb. per cheft, 30

360 at 5s. 2½d. L. 93 : 15 : —

4 chefts,

— : 10 : —

————— 94 : 5 : 0

CHARGES, viz:

Porterage,	L. — : 12 : 6
Wharfage,	— : 6 : 8
Cocket,	— : 5 : 8

————— 1 : 4 : 10

Commission on L. 156 : 17 : 2, at 2½ per cent.

L. 156 : 17 : 2

3 : 18 : 6

To the debit of Mr James Green,

————— L. 160 : 16 : 8

London, 19th January 1773,
Errors excepted,

James Newberry.

Merchants

Merchants generally prefix the words *Errors excepted* to their signature, in every accompt which they subscribe, that they may not be precluded from the correction of errors afterwards, if any be discovered; and they prefix any farther limitation or fuller explanation of the import of their subscription, if the nature of the business require it. The clause or clauses used for this purpose is called the *docquet* of the accompt.

If it be intended that the accompt shall be absolutely settled, so as to exclude all revival or alteration, this intention should be mentioned in express words in the docquet; for though the words *Errors excepted* be wanting, it will be considered as an omission, and will not bar the right of the party injured by the errors to correct them.

I. The following goods were shipped on the 12th May 1774, by William Cox, per the Sea-Horse, David Price master, from Liverpool to Grenada, consigned to D. McLean, merchant there, on the risk of the shipper, 20 casks bottled beer, qt. No. 1.—10 dozen 3 bottles; No. 2.—9.7; No. 3.—11.8; No. 4.—12.4; No. 5.—9.10; No. 6.—9.4; No. 7.—8.3; No. 8.—11.4; No. 9.—10.5; No. 10.—13.6; No. 11.—11.2; No. 12.—10.3; No. 13.—10.7; No. 14.—11.5; No. 15.—9.3; No. 16.—8.7; No. 17.—12.4; No. 18.—10.10; No. 19.—10.6; No. 20.—10.5; at 5s. 6d. per dozen; 20 casks, at 2s. 4d.; 10 firkins, qt. each $1\frac{1}{4}$ bushels split pease, at 4s. 9d. per bushel; firkins, 1s. 4d. each; 60 M. bricks, at 7s. 3d. per M.; 100 bolls lime, at 1s. 2d. per boll; portage and carriage, L. 1 : 17 : 4; customhouse dues, 13s. 6d.

II. William Rich of Glasgow purchases the following goods, and ships them for Carolina, on commission from James Hewit, per the Dolphin, James Vere, 5th May 1771; a box linen, from Alexander Hart, qt. 3 pieces 75 yards, at 3s. 6d. per yard; 12 pieces 300 yards, at 2s. 9d.; 13 pieces 294 yards, at 2s. $6\frac{1}{2}$ d.; box, 3s. 6d.; a box hardware from James Farquhar, qt. 100 sets buckles, at $10\frac{1}{2}$ d.; 50 penknives, at 1s.; 50 ditto, at 9d.; 20 pocket-books, at 16s.; 50 snuff-boxes, at 3s. 9d.; box 3s. 9d.; a bale paper, from James Hutton, qt. 10 reams post, at 17s.; 10 reams foolscap, at 14s.; and 10 reams pott, at 10s.; a box printed linens from James Reid, qt. 2 pieces 35 yards, at 5s. 9d.; 6 pieces 138 yards, at 4s. 6d.; 6 pieces 142 yards, at 3s. 6d.; and 6 pieces 158 yards, at 3s.; box, 4s. 6d.; two boxes shoes, from James Oswald, qt. No. 1. 3 dozen pair, at 4s. 9d.; 5 dozen, at 4s. 6d.; No. 2. 4 dozen, at 3s. 9d.; and 1 dozen pair boots, at 15s.; boxes, 4s. 6d. each; a box hosiery from James Ingram, qt. 3 dozen pair white thread hose, at 3s. 4d. per pair; 5 dozen worsted ditto, at 4s. 2d.; 2 dozen black ditto, at 3s. 6d.; and 1 dozen silk ditto, at 9s.; also from John Smith, 6 dozen spades, at 18s. per dozen; 12 dozen hoes, at 13s.; 4 dozen hammers, at 9s.; and 3 ploughs, at 35s. He paid for all the goods

goods at purchasing; and for carriage and incidents at shipping, 25s.; cocket, 9s.; commission, $2\frac{1}{2}$ per cent.; insurance on L. 355, at 5 per cent.; commission on the insurance, $\frac{1}{2}$ per cent.; policy, 5s. 6d. Required the bills of parcels, with the receipts, and the invoice?

III. Archibald Gibson and Co. of Dantzic shipped the following goods, 29th July 1770, per the *Intrepid*, William Weir master, for Leith, by order of Drysdale and Brown Edinburgh, 15 casks wed ashes, at *f.* 46.15; duty 28 grofs per cask; casks, cooperage, and portorage, *f.* 2.12 per cask; 350 stones flax, at *f.* 5.18 per stone; duty $4\frac{1}{2}$ grofs per stone; portorage, 36 grofs per last of 50 stone; packing, ropes, and other charges, *f.* 15.15; commission $2\frac{1}{2}$ per cent.

IV. James Hunter of Glasgow shipped, per the *Minerva*, Thomas Robertson, 16th February 1774, on account of David Watson merchant St Christopher's, 3 boxes linen, qt. No. 1. 3 pieces, 27 yards each, at 2s. 9d.; 4 pieces, 25 yards each, at 2s. 8d.; 4 pieces, 22 yards each, at 2s. 6d.; 3 pieces, 26 yards each, at 2s. 6d.; No. 2. 5 pieces, 23 yards each, at 2s. 3d.; 6 pieces, 22 yards each, at 1s. $10\frac{1}{2}$ d.; 5 pieces, 21 yards each, at 1s. 10d.; 3 pieces, 23 yards each, at 1s. 9d.; 7 pieces, 22 yards each, at 1s. 8d.; No. 3. 2 pieces, 26 yards each, at 1s. 7d.; 2 pieces, 23 yards each, at 1s. 6d.; 2 pieces, 29 yards each, at 1s. 5d.; 4 pieces, 25 yards each, at 1s. 3d.; 3 pieces, 22 yards each, at 1s. 1d.; 1 piece, 25 yards, at 9d.; and 1 piece, 22 yards, at $8\frac{1}{2}$ d.; boxes, 4s. 8d. each; 1 box thread, qt. 16 lb. at 5s. 6d. per oz.; 6 lb. 4 oz. at 4s. $2\frac{1}{2}$ d.; 3 lb. 6 oz. at 3s.; 2 lb. 10 oz. at 1s. $7\frac{1}{2}$ d.; 4 lb. at 1s. 2d.; 3 lb. $9\frac{1}{2}$ oz. at 1s. $9\frac{1}{2}$ d.; 12 lb. 8 oz. at 1s. 1d.; 2 lb. 7 oz. at $8\frac{1}{4}$ d.; box, 3s. 9d.; charges shipping, 12s.; commission, $2\frac{1}{2}$ per cent.

V. Joseph Gordoqui of Bilboa shipped, 31st May 1771, per the *Enterprize*, Charles Gordon, for London, by order of William Mercer merchant there, 88 bags wool, R. qt. each 210 lb. at 850 rials per 100 lb.; 18 ditto, F. qt. 215 lb. each, at R. 640.; 9 ditto, T. qt. 208 lb. each, at R. 430; duty, 78 rials per 100 lb.; 400 quintals iron, at R. 85 per quintal; duty, $2\frac{1}{2}$ rials per quintal; 30 bags walnuts, qt. each 2 faniques, at R. 20 per fanique; 30 bags chesnuts, qt. each $2\frac{1}{2}$ faniques, at R. 26; duty, 5 rials per fanique, charges shipping, R. 154; commission, 2 per cent.

§ 63. An ACCOMPT SALES is drawn out by the factor to whom goods were consigned for sale, and returned to his employer. It contains the quantities and values of goods sold, the charges laid out on them, the factor's commission, and the balance or nett proceeds for which he is indebted to his employer. The form is exhibited in the following specimens.

ACCOMPTS SALES of goods, received per the True Briton,
Henry Hunter master, from Bristol, for account and risk of Mr
Thomas Wilton merchant there.

50 casks BEER.

1768.

June 12. 4 To David Baird, at 26s. L. 5 : 4 : —

July 3. 22 Cash, 25s. 27 : 10 : —

Aug. 9. 23 To Hen. Wilson, 25s. 6d. 29 : 6 : 6

1 spoiled.

—

L. 62 : — : 6

50

—

100 reams PAPER.

June 15. 32 To C. Remington, at 18s. L. 28 : 16 : —

18. 12 To D. Murray, 18s. 3d. 10 : 19 : —

July 27. 56 To W. Blackader, 18s. 6d. 51 : 16 : —

—

91 : 11 : —

100

Aug. 1. 1000 yards check to Jas. Bell, at 2s. 6d.

125 : — : —

L. 278 : 11 : 6

CHARGES, viz.

Wharfage, - - L. — : 12 : 6

Warehouse rent, - - 2 : 3 : —

Porterage, - - — : 3 : —

Com. on L. 278 : 11 : 6, at 5 per c. 13 : 18 : 6

16 : 17 : —

Nett proceeds to the credit of Mr T. Wilton, L. 261 : 14 : 6

Charlestown, South Carolina, 15th August 1768.

Errors and bad debts excepted.

James Thomson.

§ 64. *Another form of the same Accompt.*

ACCOMPT SALES of goods, received per the True Briton, Henry Hunter master, from Bristol, for accompt and risk of Mr Thomas Wilton merchant there.

		50 casks beer.	100 reams paper.	1000 yards check.	
1768.					
June 12.	David Baird,	4			at 26s. L. 5 : 4 : —
15.	Chas. Remington,		32		18s. 28 : 16 : —
18.	David Murray,		12		18s. 3d. 10 : 19 : —
July 3.	Cash,	22			25s. 27 : 10 : —
27.	Wm. Blackader,		56		18s. 6d. 51 : 16 : —
Aug. 1.	James Bell,			1000	2s. 6d. 125 : — : —
9.	Henry Wilfon,	23			25s. 6d. 29 : 6 : 6
	Spoiled,	1			
		50	100	1000	L. 278 : 11 : 6

And the rest as before.

If the goods be sold on credit, and the debts at the risk of the proprietor, the factor must attend to insert the clause *bad debts excepted*, in the docquet; otherwise, in strictness, he becomes accountable for the same. If the goods be sold for ready money, or if the factor takes the risk of the debts, and charges an allowance for doing so, that clause must be omitted.

The quantities of goods in the titles of the accompt sales must be the same as in the invoice. If the quantities sold be less, through waste, or any other cause, the quantity deficient, and the cause of the deficiency, must be mentioned. If the quantity sold be greater, by reason of difference of measure, or the like, the outcome must be noticed and subtracted; and, in every case, the sum of the column sold must be brought to correspond with the quantity in the title.

I. A cargo of 690 bolls wheat, and 246 bolls pease, sent by George Coleman of London to Alexander Drysdale of Leith, per the Syren, George Barclay, was sold as follows:

2d February, 72 bolls pease for ready money, at 10s. 6d.
 5th February, 30 bolls ditto to James Bald, at 10s. 3d.
 9th February, 50 bolls wheat to James Alifon at 17s. 6d.
 19th February, 42 bolls pease to D. Niven, at 9s. 10d.
 21st February, 172 bolls wheat for ready money, at 17s. 4d.
 25th February, 468 bolls wheat to D. Ogilvie, at 17s. 3d.

K k

3d

3d March, 52 bolls pease to P. Ramsay, at 9s.

5th March, 50 bolls pease to W. Hill, at 9s. 6d.

Charges, viz. Shore-dues, L. 2 : 3 : 6; portorage and mettage, L. 3 : 14 : 4; customhouse-dues, 15s. 6d.; loft-rent, 5s. 3d.; kiln drying pease, 5d. per boll; freight of 900 bolls, at 1s. 9d.; commission, 2½ per cent.

II. The goods contained in Invoice, No. I. were sold by Daniel M. Lean, as follows:

7th July, 30 dozen beer to James Newton, at 10s. 4d.

9th ditto, 12 bushels pease to J. Dewar, at 9s.

15th ditto, 15 bushels ditto to Thomas Lindfay, at 9s. 6d.

ditto, 15 dozen beer to Thomas Neil, at 10s. 6d.

17th ditto, 106 dozen beer to James Frazer, at 10s.

23d ditto, 40 dozen ditto for ready money, at 10s. 3d.

24th ditto, 36½ bushels pease to J. Grant, at 9s. 4d.

27th ditto, 19 dozen 2 bottles beer for ready money, at 10s.

The remainder of the bottles being broken.

ditto, 28 M. bricks to D. Imrie, at 20s.

ditto, 50 bolls lime to J. Frazer, at 6s.

12th August, 32 M. bricks to J. Frazer, at 19s. 6d.

19th ditto, 50 bolls lime for ready money, at 5s. 6d.

Charges—Freight on 97 tons, at 12s.; wharfage and negro-hire, L. 4 : 12s.; commission and storage, 8 per cent.

III. A cargo provisions, sent by Matthew Burke, from Cork to St Christopher's per the Sally, Alexander, consisting of 50 barrels beef, 30 barrels pork, 10 quintals stock-fish, 40 firkins butter, and 60 barrels herrings, was sold by William Hargrave, as follows:

15th March, To James Vincent, 20 barrels beef, at 65s. and 10 barrels pork, at 83s.

17th ditto, To J. Dyer, 5 barrels beef, at 63s.

19th ditto, To James Davenport, 15 firkins butter, at 22s.

23d ditto, To Thomas Halifax, 20 barrels beef, at 67s. 5 barrels pork, at 86s. and 10 barrels herrings, at 40s.

27th ditto, To William Ruffel, 4 barrels beef, at 68s. and 10 barrels pork, at 90s.

28th ditto, To J. Freebairn, 10 quintals stock-fish, at 32s.

1st April, To A. Turnbull, 5 barrels pork, at 90s.

3d ditto, To William Davidson, 17 firkins butter, at 21s.

9th ditto, To James Nicol, 30 barrels herrings, at 42s.

17th ditto, To A. Grieve, 8 firkins butter, at 20s.

24th ditto, To William Innes, 20 barrels herrings, at 41s.

And 1 barrel beef is damaged.

Charges—Wharfage and negro-hire, L. 8 : 5 : 9; commission and storage 8 per cent.; insurance of debts 3 per cent.; freight of 160 barrel bulk, at 3s. 6d.

§ 65. An ACCOMPT CURRENT contains a state of our transactions with any person, disposed in the form of debtor and creditor on opposite pages. The method of recording accompts of this kind in the ledger will be explained in Part IV. We have only to notice at present, that, when the accompt is drawn out, the peculiar style of the ledger is laid aside, all references are supplied, and every article is fully related in common language. The following specimen is taken from Ledger B. It consists of articles paid and received at London, chiefly by bills, on accompt of a merchant in Glasgow. Merchants in most places of Britain have occasion to employ a factor in London for this purpose, as payments of foreign bills are generally made there. The factor charges commission on the amount of the transactions; but if there be any articles from which he obtains any other profit, they are deducted from the amount in charging commission. The former balance is also deducted, as commission would be charged for it in the former accompt.

§ 66. An ACCOMPT of CHARGE and DISCHARGE is of the same nature as an accompt current; but differs considerably in form. It contains, on one side, the articles intrusted to the care of a factor, for which he is accountable; on the other side, the manner in which he has rendered accompt for the same; and concludes with the balance which remains in his hands, or which is due to him by his employer. The form is exhibited in the next page.

The student will observe, that instead of charging the several articles at the time they are received, the whole sum which the factor is employed to collect is charged at once; but any part which he is not able to recover before the accompt be settled, is admitted as an article of discharge, unless the factor be bound as cautioner for the payments. If there be any goods intrusted to his care, they are charged and discharged in separate columns. And as the design of the accompt is to exhibit the state of the affairs under his management in a concise point of view, the amount of the articles alone is inserted, and the particulars of each are drawn out in separate accompts, to which the general accompt of charge and discharge refers.

DR. Mr JAMES RITCHIE Glasgow,

1776.			
Dec. 31.	To balance of former accompt due by him,	-	L. 540 — —
1777.			
Jan. 18.	To my bill on Fitzherbert and O'Haro, 21 st dst. L. 200 Irish, ex. 6½,	187	15 10
Feb. 28.	To his bill on me to J. Winter, 26 th ult. 30 ddt.	-	175 — —
Mar. 20.	To his bill on me to J. Darling, 17 th ult. 1 mdt.	-	85 — —
28.	To J. Stenhorff's bill on me, on his accompt, 25 th January 2 ufa,	76	12 —
May 18.	To his bill on me to A. Murdoch, 13 th ult. 1 mdt.	-	300 — —
July 8.	To his bill on me to J. Lawfon, 6 th May, 60 ddr.	-	290 — —
Aug. 1.	To his bill on J. Benfon, 29 th June, 30 ddt. L. 350, returned with protest, charges, 6s. 9d.	-	350 6 9
31.	To his bill on me to A. Stuart, 28 th July, 30 ddt.	-	178 — —
Dec. 10.	To J. Hunter's bill on R. Mills, 7 th ult. 30 dst. L. 300, taken up supra protest for his honour, charges, 7s. 6d.	-	300 7 6
21.	To interest due me on above accompt,	-	29 10 3
	To commission on L. 1943, at ¼ per cent.	-	4 17 1
	To postages,	-	— 13 4
			L. 2518 2 9

ACCOMPT of CHARGE and DISCHARGE by THOS. TRUSTY,

		Wheat		
		Qu.	L.	s. d.
<i>The said Thomas Trusty his charge,</i>				
1777.				
Jan. 1.	To balance of former accompt,	—	100	— —
	To arrears due by tenants, per accompt,	500	460	— —
	To wheat in granary,	700		
May 15.	To rent of the estate of Belmont for one year, per rental,	600	1200	— —
Dec. 31.	To value of wheat 300 qrs. fold, per accompt,	—	450	— —
		1800	2210	— —

his accompt current with W^M. PARKER, LONDON, CR.

1777.

Jan. 20.	By his bill on Hog and Kinloch, 17th Nov. 2 mdt.	L. 356 8 —
April 3.	By J. Hog on Penant and Johnston, 1st ult. 30 ddt.	268 12 —
	By his bill on Warren and Co. fight,	135 15 —
June 14.	By cash received from J. Harris,	300 — —
Aug. 1.	By his bill on J. Benfon, 29th June, 30 ddt.	350 — —
Dec. 31.	By balance due by him, to Dr. new accompt,	1107 7 9
		—————
		L. 2518 2 9

London, 31st December 1777.

Errors excepted,

WILLIAM PARKER.

Steward to J. OPULENT, Esq; of BELMOUNT.

		Wheat			
		Qu.	L.	s.	d.
<i>The said Thomas Trusty, his discharge.</i>					
Dec. 31.	By cash paid J. Opulent's order, per accompt,	—	1500	—	—
	By wheat sold to fundries, per accompt,	300			
	By wheat delivered to J. Badger, per order,	1200			
	By arrears due by tenants, per accompt,	180	460	—	—
	By debts outstanding for wheat sold,	—	120	—	—
	By wheat remaining in granary,	120			
	By a year's salary,	—	50	—	—
	By balance in the steward's hands,	—	80	—	—
		1800	2210	—	—

Question. Robert Rackrent is employed as factor on William Irvine's estate, Part I. § 19. The balance of last year's account in his hands is L. 36, and the following arrears are due at the beginning of the year.

By J. Mill, 6 bolls barley and L. 30.

By Thomas Gilchrist, $7\frac{1}{4}$ bolls barley and L. 50.

By Charles Tod, 20 hens and L. 30.

By J. Hill, 5 bolls barley.

He has on hand 50 bolls barley, and he receives as follows:

Feb. 1. From Lawson, Brown, Bruce, and Low, their barley rent.

March 8. The hens from all the tenants, except C. Tod.

April 10. From J. Mill, 18 bolls 3 firlots 2 pecks barley.

May 15. From William Hunter, L. 66 : 12 : 3.

From T. Gilchrist, 10 bolls barley, and L. 155.

From J. Mill, L. 60.

From A. Lawson, L. 31 : 10s.

From J. Hill, 10 bolls barley, and L. 12.

From J. Brown, L. 50.

June 12. From R. Bruce, L. 70 : 9 : 2.

July 23. From D. Law, L. 62 : 12s.

Aug. 18. From D. Barnet, L. 40.

Oct. 24. From William Blair, L. 50.

Nov. 27. From J. Brown, L. 36 : 13 : 4.

He pays William Irvine's orders, 15th May, L. 300; 18th June, L. 100; 25th July, L. 90; 31st October, L. 100; and he delivers, per his order, 10th April, 90 bolls barley; and, 2d August, 20 bolls; he also delivers the hens, and retains L. 25 for his salary.

Required the state of his accompt in the form of charge and discharge; also the accompt of arrears due by the tenants, of grain, &c. received and delivered; and the state of the cash-transactions in the form of an accompt current.

§ 67. Accompts of money received or disbursed, of goods bought or sold, and the like, are often extended in a form which exhibits the articles arranged under different heads. For this purpose, there must be as many columns prepared as there are kinds of articles, besides a column for the total; and the sum of each article is extended in the proper column, and likewise in the column for the total.

SALES of the PRODUCE of PRIESTFIELD FARM, belonging to JOHN CARTER.

[illegible]

ABSTRACT.

199	bolts wheat,	L. 162 : 13 : 6
220	peafe,	97 : 1 : 6
168 $\frac{1}{2}$	oats,	80 : 5 : 8 $\frac{1}{2}$
218	barley,	144 : 16 : 6
805 $\frac{1}{2}$		L. 484 : 17 : 2 $\frac{1}{2}$

If a regular accompt of goods fold, or charges incurred, be kept, the debts due by the several purchafers or employers may be extended from the fame. Thus the articles purchafed by Thomas Reid may be drawn out from the foregoing accompt, as follows :

Mr Thomas Reid, Bought of John Carter.

1774.					
Feb.	15.	94 bolls wheat, at 16s. 4d.	—	L. 76	15 4
March	13.	36 bolls barley, 12s. 8d.	—	22	16 —
April	13.	36 bolls barley, 12s. 9d.	—	22	19 —
May	4.	36 bolls peafe, 8s. 10d.	—	15	18 —
	19.	96 bolls barley, 14s.	— —	67	4 —
				L. 205	12 4

If the other accompts be extended in the fame manner, the fums will be found as follows :

William Johnfton,	—	—	L. 57	10 8½
Thomas Reid,	—	—	205	12 4
James Dawfon,	—	—	65	13 2
William Laing,	—	—	99	3 6
George Davidfon,	—	—	56	17 6
				L. 484 17 2½

The operation here used is of the fame nature as that of posting a ledger, and may fupply the place of a ledger, when the bufinefs is not complicated or extenfive.

Accompt of expences on the fhip Sally, for 3 months.

- Jan. 3. To 3 cwt. 2 qrs. fmall rope, at 36s. per cwt.
 18. To Thomas Smith carpenter for repairs, L. 2 : 12 : 6.
- Feb. 1. To 3 barrels tar, at 17s. 6d.
 12. To 5 barrels beef, at L. 3, 2s.
 15. To 6 cwt. 2 qrs. bifeuit, at 3d. per lb.
 18. To J. Man 2 months wages, at 35s.
 22. To Thomas Taylor 1½ month's wages, at 32s.
 28. To charges taking in balaft, 12s. 6d.
- March 1. To pilotage at Yarmouth roads, 12s. 6d.
 16. To William Smith, 3 months wages, at 25s.
 18. To 18½ yards fail-cloth, at 10½ d.
 To 15 cheefes weighing 12 ftone 14 lb. at 3½ d. per lb.
 To 12 barrels beer, at 4s. 8d.
 22. To wood for repairs, L. 4 : 8 : 9.
 To D. Burns 2½ months wages, at L. 2 : 10s.
 To J. Walker for iron bolts, L. 1 : 5s.
 To 1 anker brandy 19 pints, at 1s. 10d.
 To dues for May-light, 5s. 3d.

Required the accompt extended and arranged under the titles of repairs, victualling, wages, and port charges ; and an abftra&t?

AN
INTRODUCTION
TO
MERCHANDISE.

PART IV. ITALIAN BOOK-KEEPING.

CHAP. I.

GENERAL PRINCIPLES AND RULES.

§ 1. **B**OOK-KEEPING is the art of recording mercantile transactions in a regular and systematic manner. A merchant's books should contain every particular which relates to the affairs of the owner. They should exhibit the state of all the branches of his business; the connection of the different parts; the amount and success of the whole. They should be so full and so well arranged, as to afford a ready information in every point for which they may be consulted.

The matter which the books should contain is comprehended under the three following heads,

First, The debts which are owing to the owner, and the debts which he owes to others.

Secondly, The goods and other articles of property which belonged to him; the quantity and value sold, or otherwise disposed on; and the quantity and value which still remains in his possession.

Thirdly, The amount of his stock when the books were opened; the profits he has obtained, and the losses he has suffered since; and the amount of his stock at present.

That method of book-keeping which answers these purposes most clearly and concisely, is the best. The Italian method by *double entry*, is generally preferred: at least, it is founded upon

the most universal principles, and is the most convenient in extensive and complicated business.

This method requires three principal books, the Waste-Book, Journal, and Ledger.

§ 2. The WASTE-BOOK, or day-book, is a register of a merchant's transactions, in the order in which they take place. It begins with an inventory of every thing belonging to the owner, a list of the debts due to him, and of the debts he owes to others. It goes on with a full relation of all the money he receives or pays; of all the goods he buys or sells; and of every other occurrence in his business. Each article should be entered as soon as the transaction takes place, and should be clearly expressed in the plainest language. It should require no supply from the accountant's memory, but should be fully intelligible to any person, however unacquainted with the business: At the same time, it should be written with all convenient brevity; and therefore sometimes refers to invoices and other accounts for particulars. The accountant's first care should be to have nothing defective or ambiguous; his second to have nothing superfluous.

§ 3. The date is written in text on the top of each page. The articles are separated from each other by a line; and the transactions of one day are separated from those of another by a double line, in the middle of which there is left a blank space for inserting the day of the month. This book must be kept with the greater care, as it contains the materials from which the other books are composed; and any error or defect will occasion a like one in the others. Besides, it is the book whose authority is trusted to, and which must be exhibited to judges, or arbiters, when an account is disputed. As the journal is filled up from the waste-book, the authority of the former is esteemed more authentic, unless there be an obvious mistake through hurry; and either of these books is depended on rather than the ledger, which, from its form, is more liable to error, and may be more easily vitiated by a fraudulent design.

§ 4. As the waste-book contains the whole substance of the business, it may be applied so as to afford any information that can be wanted: But the labour of consulting it would be very great. For instance, if it were required to know how much any person owes us, we must look over the book from the beginning, and mark down every article in which we have dealt with him: Or, if it were required to know what quantity of goods we should have on hand, we must look over the whole book, and mark down every article bought or sold. This operation would not only be found very tedious, but much exposed to the risk of omissions. To prevent these inconveniences, another book is used, in which the articles are arranged in a methodical order. This book is called the
Ledger,

Ledger, and we shall consider it next; because the journal, though it comes before it in the order of writing, cannot be well understood, till the nature of the ledger be explained.

§ 5. In the LEDGER articles of the same kind are collected together: And, for that purpose, it is divided into many accompts, under which the different branches of business are arranged. Each accout is introduced by a proper title; and articles of opposite kinds, which belong to the same accout, are placed on the opposite pages of the same folio: For instance, money received on the one side, and money paid on the other; or goods bought on the one side, and goods sold on the other. The left hand page is called the *Debtor* or *Dr.* side of the accout, and the right hand page the *Creditor* or *Cr.* side. The difference between the sums of the *Dr.* and *Cr.* sides is called the *Balance*.

Accompts in the ledger are of three kinds, which answer to the three purposes of book-keeping, mentioned § 1.

§ 6. First, PERSONAL ACCOMPTS. It is necessary to open an accout for every person or company with whom there are any dealings on credit. At opening the books, if they be indebted to the owner, the debt is entered on the *Dr.*; but if he be indebted to them, it is entered on the *Cr.* During the course of the business, goods sold on trust, money paid, and every thing for which they are accountable to him, is entered on the *Dr.*; but goods bought on trust, money received, and every thing for which he is accountable to them, is entered on the *Cr.* The balance shows how much they owe him, when the *Dr.* side is greater; and how much he owes them, when the *Cr.* side is greater.

§ 7. Secondly, REAL ACCOMPTS. By this we understand accompts of property, of whatever kind, such as ready money, goods, houses, lands, ships, shares in public companies, and the like.

The accout of ready money is intituled *Cash*. On the *Dr.* side, the money on hand at opening the books is entered, and afterwards every article of money received. On the *Cr.* side, there is entered every article of money paid out; and the balance shows how much ought to be on hand. The sum of the *Dr.* side of this accout is always greater than that of the *Cr.* side.

§ 8. Accompts of goods are generally ruled with inner columns for entering the quantities. When the books are opened, the goods on hand are entered on the *Dr.* side of the respective accompts; the quantities being placed in the inner, and the values in the outer column. Goods bought are entered in the same manner, and goods sold are entered on the *Cr.* side; the quantities and values being placed in the proper columns. Charges laid out on goods are entered on the *Dr.* side; and, when an incidental advantage arises from them, such as public bounty, it is entered on the *Cr.*

If the sums of the inner columns on the opposite sides be equal,

it shows that the goods are all sold, and then the balance of the money column shows the gain or loss. If the Cr. side be greater, it is gain; if the Dr. side be greater, it is loss. If the sum of the inner column be greater on the Dr. side, it shows that part of the goods are on hand; and their value must be added to the sum of the Cr. side, before the gain or loss can be determined.

§ 9. If there be two or more kinds of the same sort of goods, they may be entered in the same account, allowing as many inner columns as there are kinds, and entering the quantities of each kind in the inner column reserved for it. This method exhibits the gain or loss on the whole goods; but does not show how much of it arises from each kind.

Or, a separate account may be opened for each kind, distinguishing the titles by the qualities, or by some other mark. Thus, one account may be kept for fine linen, another for coarse linen; one for port-wine crop 1772, another for port-wine crop 1773; one for rum from Jamaica, another for rum from Barbadoes. This method shows the gain or loss on each kind.

§ 10. Accounts of ships contain on the Dr. the value of the ship when the books are opened, and all expences laid out thereon: On the Cr. all freights received. In like manner, accounts of houses or lands have the value of the subject, and all repairs, or other charges, entered on the Dr. and all rents, or other profits received, on the Cr. If the subject be sold in whole or in part, the sale is entered on the Cr. And the balance, after valuing the subject (if any) on hand, shows the gain or loss.

Accounts of property in the public funds, or shares in companies, public or private, contain the value, or money paid in, on the Dr. and the dividends received on the Cr. and are balanced as other real accounts.

In general, real accounts contain the value of the property, and all charges, on the Dr. and the sales and other returns on the Cr. When the account is to be balanced, if any property remains, the value thereof is placed on the Cr.; and then the balance shows the loss or gain, according as the Dr. or Cr. side is greatest.

§ 11. Thirdly, Accounts of STOCK, PROFIT, and LOSS, and its subsidiary accounts, which are sometimes called Fictitious accounts.

The STOCK account contains on the Dr. the amount of the debts which the owner owes when the books are opened; and, on the Cr. the amount of ready money, goods, debts, and property of every kind belonging to him; therefore the balance shows the extent of his nett stock; or, in case of bankruptcy, how much his debts exceed his effects. There is nothing further entered on this account till the books are balanced; and then, if the business has yielded profit, the nett gain is entered on the Cr.; if it has been unsuccessful,

unsuccessful, the nett loss is entered on the Dr. ; after which, the balance shows the nett stock at the time the books are closed.

§ 12. The PROFIT and LOSS account contains every article of gain on the Cr. and every article of loss on the Dr. The balance shows the nett gain or loss, and is transferred to the proper side of the stock-account, as mentioned above. This account is partly composed of articles that occur while the books are running. For example, legacies received are entered on the Cr. ; goods destroyed on the Dr. The rest of the articles are those of gain and loss, arising from the real accounts, which are collected when the books are balanced.

§ 13. It has been found convenient to open several subsidiary accounts, in order to shorten and methodize that of profit and loss. These contain certain articles of gain or loss, which may be reduced under distinct heads. They are in effect so many parts of the profit and loss account, and their balances are entered on the proper side of that account when the books are closed. The chief of these accounts are the following :

Interest account, Which contains on the Dr. sums paid or incurred for interest ; and on the Cr. sums received, or become due for the same.

Commission account, Which contains on the Cr. articles of gain received or owing us for our trouble in transacting business for others. There are seldom any entries on the Dr.

Charges merchandize, Which contains on the Dr. all charges paid or incurred on the business, which do not belong to any particular account, as shop-rent, public burdens for trade, clerks wages, postages, and the like. If any of these should afterwards be charged to some other account, the sum so charged is entered on the Cr.

Proper expences, Which contains on the Dr. money or any thing else, withdrawn from the trade for our private use. There are seldom any entries on the Cr. The amount of this account, as well as the former, is not properly loss ; but, as it has the same effect in diminishing the stock, it is placed in the same manner to the Dr. of profit and loss.

Loss by bad debts, Which contains on the Dr. such debts as we reckon desperate ; and, on the Cr. any of these which may happen to be unexpectedly recovered.

Account of abatements, Which contains on the Dr. discounts allowed by us on payments received ; on the Cr. discounts allowed to us on payments made. It is particularly useful in retail business, where discounts are often given, to show how much they amount to.

Insurance account, Which contains on the Cr. premiums received for making insurances ; and, on the Dr. losses sustained on the same. There may be several accounts of this kind, such as insurance

rance against sea-hazard, which is the most common; insurance against fire; insurance of lives; and insurance of debts. The balance shows the gain or loss which arises from being concerned in insurance.

§ 14. Every simple transaction in business belongs to two accounts, and must be entered on the Dr. of the one, and on the Cr. of the other. Thus, when a person becomes indebted to us, the article he owes must be entered on the Dr. of his account; and, if it be for money paid him, it is also entered on the Cr. of cash; if for goods sold, it is entered on the Cr. of the account of goods; if for any thing delivered him by another person at our desire, it is entered on the Cr. of the deliverer's account; if for any wager or bargain, by which we are gainers, it is entered on the Cr. of profit and loss. Thus, in whatever way the debt arises, it is entered on the Cr. of some other account, as well as on the Dr. of the person's account who owes it.

In like manner, when we become indebted to any person, the article we owe must be entered on the Cr. of his account. If it be for money received, it is also entered on the Dr. of cash; if for goods bought, it is entered on the Dr. of the account of goods; if for any thing delivered to another person, at our desire, it is entered on the Dr. of the receiver's account; and, if it be in consequence of a losing bargain, it is entered on the Dr. of profit and loss.

Again, when goods are received, the transaction is entered on the Dr. of the account of goods. If they be bought for ready money, it is also entered on the Cr. of cash; if on trust, it is entered on the Cr. of the seller; if they be exchanged for other goods, it is entered on the Cr. of the goods delivered; if they be obtained by some profitable business, without any return, it is entered on the Cr. of profit and loss.

When goods are delivered, the transaction is entered on the Cr. of the account of goods; and, if they be sold for ready money, it is also entered on the Dr. of cash; if on credit, it is entered on the Dr. of the purchaser; if exchanged for other goods, it is entered on the Dr. of the goods received; and, if they be given gratis, or destroyed, it is entered on the Dr. of profit and loss.

Lastly, When any article of loss occurs, the transaction is entered on the Dr. of profit and loss, and, as we must either pay it in money or goods, or remain indebted to some person for it, it must be entered on the Cr. of cash, or of goods delivered, or of the person intitled to receive it. And, when an article of gain occurs, it is entered on the Cr. of profit and loss, and also on the Dr. of cash or goods, if money or goods be received; and on the Dr. of the person accountable for it, if not immediately paid.

Thus every article in any account, whether personal or real, or belonging to profit and loss, corresponds to some other article on the

the opposite side of a different accompt. The same sum is entered on the Dr. of one accompt, and on the Cr. of the other; and it follows from this, that, *If all the accompts in the ledger be added, the amount of the sums of the Dr. will be equal to those of the Cr.*

§ 15. The JOURNAL is a fair record of all the transactions compiled from the waste-book, in the same order as they stand there; but expressed in a technical style, that it may be more easily transferred to the ledger.

When we are to enter any article in the journal, we must consider which accompts in the ledger it will require to be placed to, both on the Dr. and Cr. and write [*the former accompt*] Dr. to [*the latter accompt*]; then we annex an explanation of the article, and place the sum in the money column.

Example.

Waste-book.) Sold for ready money, 30 yards linen,	L. 4 10 —
at 3s.	
Journal.) <i>Cash Dr. to Linen</i> , sold 30 yards, at 3s.	4 10 —

Here we consider, that the article must be entered on the Dr. of cash, because money is received; and on the Cr. of linen, because linen is delivered: Therefore we write *Cash Dr. to Linen*; to which we annex the nature of the transaction. The article thus entered is called a Journal post; *Cash* is called the Dr. *Linen* the Cr. the words *Cash Dr. to Linen*, the *Entry*; and the following words the *Narration*.

The learner will be able, from this example, to enter any simple article in the journal, providing he knows the accompts to which it should be posted on the Dr. and Cr. of the ledger. This must be collected from the description of the ledger accompts already given § 6—13. and the nature and tendency of the article.

§ 16. *General Rules for the Journal entries.*

I. *Every thing received, or person accountable to us, is Dr.*

II. *Every thing delivered, or person to whom we are accountable, is Cr.*

§ 17. As the whole art of writing the Journal depends on a proper choice of the Drs. and Crs. we shall give some particular rules for the most common cases, and a few examples for the illustration and practice of each.

Rule I. *The person to whom any thing is delivered is Dr. to the thing delivered, when nothing is received in return.*

Therefore when money is paid, the receiver is Dr. to cash.

When goods or other property is sold on credit, the purchaser is Dr. to the thing sold. Thus,

Waste-

Waste-book.) Paid John Bell in full	L. 52 — —
Journal.) <i>John Bell Dr. to Cash</i> , paid him in full,	52 — —
Waste-book.) Sold 50 yards cloth to J. Hill, at 12s.	30 — —
Journal.) <i>J. Hill Dr. to Cloth</i> , sold him 50 yards, at 12s.	30 — —

Ex. 1. Lent William Jamefon for 2 months,	L. 75 — —
2. Sold Thos. Penant 30 qrs. wheat, at 43s.	
3. Sold Smith and Payne 24 cwt. fugar at 56s.	
4. Paid J. Hunter in full for 18 yards lawn formerly bought, at 3s. 2d	
5. Sold A. Ferguson 16 dozen Madeira wine, at 33s.	
6. Paid D. Powel in full	45 — —

§ 18. Rule II. *A thing received is Dr. to the person from whom it is received, when nothing is delivered in return.*

Therefore, when money is received, Cash is Dr to the payer :
When goods are bought, the goods are Dr. to the feller. Thus,

Waste-book.) Received from Thomas Gay in full	L. 72 — —
Journal.) <i>Cash Dr. to Thomas Gay</i> , received in full	72 — —
Waste-book.) Bought from J. Hawley 60 lb. wool, at 9d.	2 5 —
Journal.) <i>Wool Dr. to J. Hawley</i> , bought 60 lb. at 9d.	2 5 —

Ex. 1. Received from D. Cargill in full	L. 45 10 —
2. Received from Thomas Simfon in part	35 17 10
3. Bought from J. Wren 13 bags cotton qt. each 1 cwt. 3 qrs. at L. 5, 10s.	
4. Bought from Wilfon and Campbell 13 hds. claret, at L. 36.	
5. Borrowed from A. Keir, per note on demand	100 — —
6. Bought from John Wharton the lands of Begbie, rent L. 57, at 32½ years purchase.	

§ 19. Rule III. *A thing received is Dr. to the thing given for it.*

Therefore goods bought for ready money are Dr. to Cash.

When goods are sold for ready money, Cash is Dr. to the goods.

When goods are bartered, the goods received are Dr. to the goods delivered. Thus,

Waste-B.) Bought for ready money 10 hds. wine, at L. 15,	L. 150 — —
Journal.) <i>Wine Dr. to Cash</i> , bought 10 hds. at L. 15	150 — —
Waste-B.) Sold for ready money 100 gallons rum at 9s.	45 — —
Journal.) <i>Cash Dr. to Rum</i> , sold 100 gallons at 9s.	45 — —
Waste-book.) Bartered 3 hds. wine, at L. 15, for 100 gallons rum, at 9s.	45 — —
Journal.) <i>Rum Dr. to Wine</i> , received 100 gallons at 9s. in barter for 3 hds. at L. 15.	45 — —

- Ex. 1. Bought for ready money 100 yards silk, at 5s. 7d. L.
2. Sold for ready money 86 lb. pepper, at 10d.
3. Bartered 50 yards linen, at 3s. 6d. for lb. flax, at 10½d.
4. Sold for ready money $\frac{1}{3}$ share of Newton bleachfield, the whole value of which is L. 350.
5. Bought for ready money L. 300 capital in South-sea stock, at 125½
Brokerage $\frac{1}{8}$ per cent.
6. Paid for $\frac{1}{3}$ share of the ship Edward, 300 quarters wheat, at 43s. 8d.

§ 20. Rule IV. *Goods and other real accmpts are Dr. for all charges laid out on them. If money be laid out, they are Dr. to Cash: If any thing else be delivered, they are Dr. to the thing delivered: If the charge be taken on trust, they are Dr. to the person to whom it is due.* Thus,

Waste-book.) Paid for repairs to ship Traffick,	L. 18 — —
Journal.) <i>Ship Traffick Dr. to Cash</i> , paid for repairs,	18 — —
Waste-book.) Due to William Carpenter for repairs to the Angel-tavern	12 — —
Journal.) <i>Angel-tavern Dr. to William Carpenter</i> , due him for repairs	12 — —

- Ex. 1. Paid for cellar-rent of Port-wine L. — 12 —
2. Paid for insuring L. 200 on ship Mary, at 3 guineas per cent.
3. Due James Warburton shipmaster for freight of 600 bushels salt, at 4½d.
4. Delivered from my warehouse 3 barrels of tar, at 16s. for repairing the ship Mary
5. Paid duty on 18 tons iron, at L. 3 : 6 : 8
6. Paid for 600 bushels lime, at 5d. for improving the lands of Begbie

§ 21. Rule V. *When rents of houses or lands, freights of ships, bounties on goods, or any other profits from real accmpts are received, Cash is Dr. to the accmpt from which the profit arises: If any thing besides money be received, the article received is Dr. : If they remain unpaid, the person who owes them is Dr.* Thus,

Waste-book.) Received freight of the ship Traffick for a voyage to London	L. 35 — —
Journal.) <i>Ship Traffick Dr. to Cash</i> , received freight to London	35 — —
Waste-book.) Received 100 barrels salmon, being the rent of Inver fishery, at 52s.	260 — —
Journal.) <i>Salmon Dr. to Inver fishery</i> , received the rent, being 100 barrels, at 52s.	260 — —

Waste-book.) John Public owes me a year's rent of the Angel-tavern	L. 52 — —
Journal.) <i>John Public Dr. to Angel-tavern</i> , for a year's rent due by him	52 — —
Ex. 1. Received $\frac{1}{2}$ year's rent of the lands of Begbie	L. 22 10 —
2. Received bounty on importing 350 lb. indigo, at 6d. per lb.	
3. James Davidson owes me for rent of a house in Fleetstreet, London	35 — —
4. Received for freight of the ship Mary to Lisbon, 4 pipes wine, at L. 28.	
5. Received a quarterly dividend on my L. 300 capital in South-sea stock, at $\frac{1}{4}$ per cent.	
6. Received the victual-rent of the lands of Begbie, being 18 bolls meal, at 13s. 4d.	

§ 22. Rule VI. *When an article of loss occurs, Profit and Loss, or some subsidiary account, is Dr. If the loss be paid in ready money, it is Dr. to Cash: If it be paid in any thing else, it is Dr. to the thing delivered. If it remain unpaid, it is Dr. to the person to whom it is owing.* Thus,

Waste-book.) Given my daughter at her marriage	L. 500 — —
Journal.) <i>Profit and Loss Dr. to Cash</i> , given my daughter at her marriage	500 — —
Waste-book.) Taken from my cellar for my own use 1 hd. port-wine	20 — —
Journal.) <i>Profit and Loss [or proper expences] Dr. to Port-wine</i> , taken 1 hd. for private use	20 — —
Waste-book.) Due James Rich for a year's interest on L. 1000, at 4 per cent.	40 — —
Journal.) <i>Profit and Loss [or Interest account] Dr. to James Rich</i> , due him a year's interest on L. 1000, at 4 per cent.	40 — —

Ex. 1. The ship Mary is lost on a voyage from Jamaica, and no insurance on it; value	L. 550 — —
2. Paid Thos. Simson $\frac{1}{2}$ year's interest of 1000 merks Scots, at $4\frac{1}{2}$ per cent.	
3. Paid small charges on my business for a month	1 15 4
4. Due Henry Maiben my clerk for a half year's salary	25 — —
5. James Irvine having died bankrupt, the debt he owed me is lost	50 — —
6. Paid William Moyse an average loss on L. 160 insured per the Phoenix, John Jackson master, at 25 per cent.	

§ 23. Rule VII. *When an article of gain occurs, Cash, the article received, or the person accountable for it, is Dr. to Profit and Loss, or to some subsidiary accmpt. Thus,*

Waste-book.) Received in a gift from my father, L. 100 — —
Journal.) *Cash Dr. to Profit and Loss*, received from my father 100 — —

Waste-book.) Received in like manner at opening shop,
100 yards cloth, at 12s. 6s — —

Journal.) *Cloth Dr. to Profit and Loss*, received from my father at opening shop 100 yards, at 12s. 60 — —

Waste-book.) James Barbour owes me a year's interest of L. 1000 50 — —

Journal.) *James Barbour Dr. to Profit and Loss* [or to *Interest accmpt*] due by him for a year's interest of L. 1000. 50 — —

Ex. 1. Received payment from W. Hill of a legacy left me by J. Dod L. 100 — —

2. James Dodson owes me for commission on L. 356, at $2\frac{1}{4}$ per cent.

3. James Gilmour owes me for my half share profits on a joint adventure 30 — —

4. Received in a legacy from John Friend a house and garden at Islington, value 500 — —

5. Received premium for insuring L. 250 per the Fair Trader, Walker, from Glasgow to Boston, at 8 guineas per cent.

6. Received from Ja. Miller interest on L. 256 from 28th May to 19th September, at 5 per cent.

§ 24. Rule VIII. *When one person pays money, or delivers any thing else to another on our accmpt, the person who receives it is Dr. to the person who pays it. Thus,*

Waste-book.) James Goldsmith has paid the Bank of Scotland on my accmpt L. 100 — —

Journal.) *Bank of Scotland Dr. to James Goldsmith*, paid them by him 100 — —

Waste-book.) Arthur Young has delivered James Baker 100 quarters wheat, for which I am to account to him at 30s. 150 — —

Journal.) *James Baker Dr. to Arthur Young*, for 100 qrs. wheat delivered him on my accmpt, at 30s. 150 — —

Payments of this kind are often transacted by bills of exchange.

Ex. 1. Henry Spelman has paid Thomas Rochford,
at my desire, per receipt L. 150 — —
M m 2 2. De-

- Ex. 2. Delivered William Crosbie an order on Cox and Mair L. 500 — —
3. Thomas Cloathier has delivered John Mercer 100 yards cloth, for which I am to satisfy him at 15s.
4. Thomas Cartney has paid James Wheeler's bill on him on my accmpt L. 72 — —
5. James Crawford has drawn on J. Haliburton, Dunkirk, on my accmpt, Lrs. 7382.
- Ex. 31 d.

§ 25. These examples will make the learner acquainted with the form of the Journal; and the rules extend to the greatest part of the simple transactions that occur in domestic trade. We may observe, that the technical sense of the words *Dr.* and *Cr.* has an analogy to their meaning in common language, but is not precisely the same. Thus, in Ex. 1. Rule VIII. the Journal-entry is, *Bank of Scotland Dr. to James Goldsmith*; by which we are not to understand that the bank is indebted to James Goldsmith; for a debt between them has no connection with our business: The meaning of the entry is, that the bank becomes indebted to us by the transaction narrated; and that we become indebted to James Goldsmith by the same.

§ 26. An article which contains more Drs or more Crs. than one, is called a complex post. The form of these will appear from the following examples:

Ex. 1. Sold William Drapier,
 25 pieces cloth, at L. 15 per piece L. 375 — —
 130 stones wool, at 5s. 6d. per stone 35 15 —
 ————— L. 410 15 —

If the two articles sold to William Drapier were entered separately in the waste-book, and transferred to the Journal by Rule I. they would stand thus:

William Drapier Dr. to Cloth, sold him 25 pieces,
 at L. 15 — — — — — L. 375 — —
William Drapier Dr. to Wool, sold him 130 stones,
 at 5s. 6d. — — — — — 35 15 —

And if these were posted to the ledger, there would be two articles placed to the Dr. of William Drapier, one to the Cr. of Cloth, and one to the Cr. of Wool.

But the sales may be entered in the form of one complex journal post, as follows:

William Drapier Dr. to Sundries,
To Cloth, for 25 pieces, at L. 15 L. 375 — —
To Wool, for 130 stones, at 5s. 6d. 35 15 —
 ————— L. 410 15 —
 And

And then there is only one article on the Dr. of William Drapier in the ledger.

Ex. 2. Sold 10 pieces cloth to William Drapier,

	at L. 15	L. 150 — —
12 ditto to John Mercer,	at do.	180 — —
—		— — — —
22		L. 330 — —

This example also falls under Rule I. But whereas there was one Dr. and two Crs. in the former example, there are two Drs. and one Cr. in this: William Drapier and John Mercer, the purchasers, are Drs. for their respective quantities; and cloth, which is the only thing delivered, is Cr. for the whole quantity. The Journal post is,

Sundries Drs. to Cloth,

William Drapier, for 10 pieces,	at L. 15,	L. 150 — —
John Mercer, for 12 ditto	ditto	180 — —
—		— — — —
22		L. 330 — —

Ex. 3. Bought from Henry Hood,

5 puncheons rum,	at L. 42,	L. 210 — —
3 hds. claret,	at 33,	99 — —
2 pipes Madeira,	at 56,	112 — —
		— — — —
		L. 421 — —

This example falls under Rule II. The articles received, rum, claret, and Madeira, are Drs.; and the person from whom they are received is the only Cr.

Sundries Dr. to Henry Hood,

Rum, for 5 puncheons,	at L. 42,	L. 210 — —
Claret, for 3 hds.	at 33,	99 — —
Madeira, for 2 pipes,	at 56,	112 — —
		— — — —
		L. 421 — —

Ex. 4. Sold 150 qrs. beans to A. Arnot, at 13s. 4d. L. 100 — —

75 ditto to S. Berry,	13s. 4d.	50 — —
18 ditto, for ready money,	13s. 2d.	11 17 —
—		— — — —
243		L. 161 17 —

Here beans are delivered, some to different purchasers on trust, and some for ready money. The purchasers are Drs. for the quantities sold to each, by Rule I.; Cash is Dr. for the quantity sold for ready money, by Rule III.; and beans are Cr. for the whole.

Sundries Dr. to Beans.

Alex. Arnot for 150 qrs. at 13s. 4d.	L. 100 — —
S. Berry for 75 13s. 4d.	50 — —
Cash for 18 13s. 2d.	11 17 —
	— — — —
	L. 161 17 —

Ex.

Ex. 5. Bought from David Young 8 cwt. 3 qrs. copper, at L. 12 per cwt.

L. 105 — —

Paid in part,

L. 50 — —

Balance,

55 — —

————— L. 105 — —

Here the article received, copper, is the only Dr.; but as it is bought partly for ready money, and partly on credit, it is Dr. to Cash for the value of the former, by Rule III. and to the feller for the value of the latter, by Rule II.

Copper Dr. to Sundries.

For 8 cwt. 3 qrs. at L. 12 per cwt. L. 105 — —

To Cash in part, — —

L. 50 — —

To D. Young, for balance due him,

55 — —

————— L. 105 — —

Ex. 6. James Wilson being bankrupt, I have accepted a composition on the debt due by him to me of L. 150, and discharged the same.

The composition received, at 15s.

per L, is — —

L. 112 10 —

And the balance lost, — —

37 10 —

————— L. 150 — —

Here the whole debt of L. 150, due by James Wilson, is cancelled, and he must therefore be stated as Cr. for that sum. Cash is Dr. for the sum received, by Rule II.; and Profit and Loss, or Loss by bad debts, for the rest, by Rule VI.

Sundries Dr. to James Wilson,

Cash, for comp. on L. 150, at 15s. per L, L. 112 10 —

Profit and Loss, for balance lost,

37 10 —

————— L. 150 — —

§ 27. In some articles there are both more Drs. and more Crs. than one. These may be entered in one journal-post, *Sundries Dr. to Sundries*, specifying first the Drs. and then the Crs. But as this method is somewhat perplexed, we would recommend it, as a better way, to divide the transaction into two journal-posts; so that the first may contain only one Dr. and the second only one Cr.

Ex. Bartered with James Fotheringal

100 pieces of naburbs, at 12s.

L. 60 — —

100 lb. thread, at 3s. 6d.

17 10 —

————— L. 77 10 —

For

For 10 hds. linfeed, at 50s.	L. 25 — —	
500 yards linen, at 1s. 6d.	37 10 —	
And received the balance in money	15 — —	
		L. 77 10 —

JOURNAL. *Sundries Dr. to Sundries.*

Linfeed, for 10 hds. at 50s.	L. 25 — —
Linen, for 500 yards, at 1s. 6d.	37 10 —
Received in barter from J. Fotheringal	
Cash, for balance	15 — —
	L. 77 10 —

To Osnaburgs, for 100 pieces, at 12s.	L. 60 — —
To Thread, for 100 lb. at 3s. 6d.	17 10 —
Delivered him in barter	
Or rather,	L. 77 10 —

Sundries Dr. to James Fotheringal.

Linfeed, for 10 hds. at 50s.	L. 25 — —
Linen, for 500 yards, at 1s. 6d.	37 10 —
Received in barter	
Cash, received balance	15 — —
	L. 77 10 —

James Fotheringal Dr. to Sundries.

To Osnaburgs, for 100 pieces, at 12s.	L. 60 — —
To Thread, for 100 lb. at 3s. 6d.	17 10 —
Delivered in barter	
	L. 77 10 —

§ 28. It is neither practicable nor necessary to enumerate all the kinds of complex posts that may occur in business. The specimens annexed to this and the following chapter contain a considerable variety, with an explanation of such as are difficult. We shall only mention at present the entries which occur at opening the books.

The first journal-post contains the substance of the inventory. The entry is *Sundries Drs. to Stock*; the particular Drs. are Cash, the different kinds of goods and other property belonging to us, and the persons indebted to us.

The second journal-post contains the debts due by us; the entry is, *Stock Dr. to Sundries*; the particular Crs. are the persons to whom we are indebted.

The form of these entries is more fully exhibited at the beginning of the following sets.

§ 29. The Journal should be written by one person, in a fair hand, and at leisure-hours. The articles are separated, and the titles and dates marked in the same manner as in the waste-book, § 3. The entries are written in half text, for ornament and distinction. In the inventory, the designation (or the business, station, and place of

of residence) of every person is mentioned; and the same is done the first time that any new personal account occurs in Journal-entry. At other times, it is sufficient to enter the name without the designation, unless we have dealings with two persons of the same name; in which case, it is always necessary to annex the designation, in order to distinguish them. The narration should be complete, without referring to the waste-book; and so clear, that every person acquainted with the style of the Journal may understand it with ease. When the post is written, we mark a dash / against the article, on the margin of the waste book, to show how far the writing of the journal is advanced.

Directions for Posting and Balancing the Ledger.

§ 30. The first thing to be done in the Ledger, is to allot a proper space for each account. The accounts may be either opened in the same order that they occur in the Journal; or accounts of the same kind may be placed together, the personal accounts on one part of the Ledger, and the real accounts in another. The accounts of Stock, and Profit and Loss, are generally placed at the beginning. The number of the folio is marked at each corner of the top-line; and the titles of the accounts are written in fair text through both folios, if necessary. The designations of the personal accounts may be written on half text, or Italian hand; and some write the titles in Saxon hand, for ornament. The word *Dr.* is prefixed to the title on the left hand page; and *Contra Cr.* annexed to it on the right hand page.

§ 31. Next, An Index must be provided for pointing out the folios where the accounts are opened. The titles of the accounts are entered alphabetically in the index, and the number of the folio annexed. Personal accounts are entered by the first letter of the surname; companies, by the first letter of the surname of the first partner; and all other accounts, by the first letter of the first word. The most convenient kind of index is a long narrow book, of 24 leaves, one for each letter of the alphabet. A is marked on the top of the first leaf, and the paper pared away below it; B is marked on the second leaf, under A; and the other letters on the following leaves, in the same manner.

§ 32. In posting the ledger, proceed by the following directions: First, look for the *Dr.* of the journal post in the index, under the proper letter, and this directs you to the folio of the ledger where the account is, if it be already opened: If not, you must allot a space for it, write the title, and enter it in the index. Then enter the article on the left hand page of the account under the title, or the former article, by writing the date on the margin, and the name of the creditor on the line, with the word *To* prefixed, and a short narration of the transaction annexed; and inserting the

sum in the money column, and the quantity, if it be an accompt of goods, in the inner column. Then turn to the accompt of the Cr. of the journal-post, and enter the article in the right hand page, prefixing the word *By* to the name of the Dr.

§ 33. This being done, turn to the journal, and mark on the margin the numbers of the folios to which the article is posted. The figures which point out the references to the Dr. and Cr. folios should be separated by a line: For example, if the Dr. entry be on the third folio, and the Cr. entry on the fifth, the reference is marked $\frac{3}{5}$. These figures show how far the posting is advanced, and are useful in comparing the books.

The figures for dates or references should be written in a lighter hand than the figures in the columns for money or quantity.

§ 34. There is often a reference-column ruled in the ledger, for pointing out the other entry, corresponding to any article. In this column, the folio of the Cr. entry is marked against the Dr. article, and the folio of the Dr. entry against the Cr. article.

Sometimes the accompts are numbered according to their order in the ledger; and references, both in the journal and ledger, are made by the number of the accompt instead of the folio.

§ 35. In complex posts, turn to the several Drs. or Crs. in their order, and enter the articles according to the foregoing directions; placing the sums belonging to each in the money-column, against the respective entries.

§ 36. An article in the ledger is generally comprehended in one line. The narration should be as full as can be contained in that bounds. If it cannot be narrated completely, the journal is referred to for further particulars, by writing *per Journal*, (or *p. J.*) either after an incomplete narration, or immediately after the Dr. or Cr. when there is no room for a proper narration. In complex posts, there can seldom be any narration annexed to the single Dr. or the single Cr. The entry is generally *To Sundries per J.* or, *By Sundries, per J.* If the sense of the whole article can be narrated, it should be done; but it is improper to narrate the first or any other part of the article, and omit the others.

We may observe to the young accomptant, that if he shorten or omit the narrations in the ledger, to save time in writing, he will afterwards find he has mistaken his aim; as it will much increase the trouble of extending the accompts, or applying the books to any purpose whatever.

§ 37. When the space allotted for an accompt in the ledger is filled up, the accompt must be transported to another folio. For this purpose, add the columns on both sides, and write against the sum, *Transported to folio* , inserting the number of the folio where the new accompt is opened in the reference-column, or on the line,

N n

if

if no reference-column be used. Then, after titling the new accompt, and entering the number or the folio in the index, write on the Dr. *To amount, brought from folio* , inserting the number of the folio where the old accompt was; and on the Cr. *By amount brought from folio* ; and place the sums, and quantities, if any, in the proper columns.

When either side of an accompt is full, both sides should be transported, and diagonal lines drawn, to fill up the vacant space of the side which requires it.

§ 38. The books should be written up as frequently as can be done conveniently, so that the journal may keep pace nearly with the waste-book, and the ledger with the journal. Each book should be carefully revised, and compared with the book from which it is posted. In comparing the ledger, observe the following directions:

Begin with the first journal-post, and turn to the folio of the ledger where the Dr. is entered, which you are directed to by the marginal reference, and compare the date, entry, and sum. If you find them to correspond, it is well; if not, the ledger must be altered, till it correspond with the journal. Then place a dot before the reference figure in the journal, and a mark = before the sum in the ledger.

Proceed in the same manner to compare the Cr. of the journal-post, and all the following posts in their order. The dots in the journal show how far the comparison is advanced, and the marks in the ledger show what articles are compared.

It will be more convenient if two persons assist each other in comparing the ledger. One has the journal before him, and reads the reference figure, titles of the accompt, and Dr. or Cr.; the other turns to the accompt, and reads the article.

The sums of accompts transported should be left blank till the books be compared; as an error in any article will occasion an alteration in the sum.

§ 39. Some accomptants correct all errors in the ledger, without erasing any thing, by the following methods: 1st, If the sum be entered too small, they make a second entry for the deficiency. 2d, If it be entered too large, they make an entry on the opposite side for the excess. 3d, If it be entered on the wrong side of the accompt, they enter it twice on the other; once to counterbalance the error, and a second time for the true entry. 4th, If it be entered on a wrong accompt, they charge the wrong account Dr. to, or Cr. by, the right one.

§ 40. We do not much approve of these methods, as they give the books a confused appearance; and would rather recommend the following rules.

1st, If an article be omitted, do not attempt to interline it at the

the place where it should have been; but insert it under the last article when you discover the omission, and mark a cross $\times$ against it on the margin, and another at the place where it should have been.

2d, If you discover a mistake immediately when committed, correct it without cancelling any thing, as in this example. *To Cash, say, To James Spiers received to account.*

3d, If you have written a line entirely wrong, or in a wrong place, write the word *Error* at the end, prefix a cross, and omit or cancel the sum.

4th, Cancel errors, by drawing a line lightly through them, so that the old writing may still be legible; by which it will be evident, that the book has not been vitiated for a fraudulent purpose. The same method should be followed in correcting errors in the journal.

§ 41. When the comparison of the books is finished, glance over the ledger, to observe if the mark of comparison be affixed to every article. If not, you must turn to the journal, and observe if the articles be right which had not been marked.

§ 42. Because the whole sum of the Dr. side of the ledger should be equal to the whole sum of the Cr. (§ 14.) it is proper to try if they correspond. For this purpose, you may add the Dr. of every account, except such as are already balanced, placing the sums in an inner column, and extending them at the end of one or more folios, as you find most convenient, to the outer column; and as you go along, add the Cr. in the same manner. If the sum total of both sides be equal, it gives a presumption that the books are right; if they differ, there is certainly some mistake. This is called the *Trial-balance*. The labour bestowed on it is not lost, as the sums may be reserved for assisting us to collect the balances; the method of which will be explained afterwards.

§ 43. If the sums of the trial-balance do not correspond, the books must be examined again. For this purpose, begin with the first article on the Dr. side of the first account, and turn to the account where the corresponding entry is, which you will find by the figure in the reference column. If the articles agree, mark them with a dot. Proceed in like manner with the other articles on the Dr. of the first account; then with the articles on the Cr. of the same; and then with the following accounts in their order, till the error or errors be discovered. In complex entries, observe if the amount of the sums on one side be equal to the sum on the other. When you come to a dotted article, you may pass it by, because it has been examined already.

If the errors be not discovered at the first revival, you must repeat the same operation again, till you bring the books to balance. Marks different from the former ones, or differently placed, may

be used to signify that an article has been examined a second or a third time. As the detection of errors is the most tedious and disagreeable part of book-keeping, the accountant will be induced to guard against them with all possible care, when he has once experienced the trouble which they occasion.

§ 44. Before we explain the method of balancing the books, it will be proper to direct the learner how to balance particular accompts. When we settle accompts with any person, and ascertain how much is owing by either party, it is necessary to balance his accompt in the ledger, and open a new one, beginning with the sum that was due according to the settlement; and when we settle accompts again, we must go back to that article, and no farther.

If any articles be charged on either side, at the time of settling, they must be immediately entered on the waste-book; from which they will pass in course to the journal and ledger; and a remark must be entered in the waste-book, that the accompt was settled, and the balance transferred to the proper side of the new accompt. This remark is transcribed in the journal; and the ledger accompt is balanced, when it occurs in the course of posting.

If the balance be due to you, write on the Cr. *By balance due by him to Dr. new accompt*, and insert the sum due you; after which, the amount of both sides will be equal. Add the accompt, placing the sums opposite to each other; and if the sides be unequal, draw a diagonal line through the vacant space of the shorter side, and close the old accompt by drawing lines under the sums. Then open the new accompt immediately under the old one, or in a new folio, if the old one be full, by writing on the Dr. *To balance of former accompt due by him*. If the balance be due by you to him, the entries are made on the opposite sides, with the necessary alterations. When the new accompt is opened in the same folio, it is unnecessary to repeat the title; but the year and month, as well as the day, are repeated at the date of the first article.

§ 45. Sometimes when an accompt is balanced, one or more articles are left out on purpose: For example, Goods lately bought on credit may be left out, and the settlement may only relate to articles of longer standing. When this is the case, if the articles omitted be on the Dr. of the ledger, we write on the Cr. thus, *By articles sold him since 1st January replaced*: And when we have balanced the accompt, and opened a new one, we write on the Dr. *To articles replaced at settling, furnished since 1st January*: Or if the articles were left out for any other reason, we explain the same in the narration. If the omitted articles be on the Cr. the like entries are made on the opposite sides. A memorandum should be entered in the waste-book and journal when this operation is necessary.

§ 46. Merchants generally balance their books once a-year. The design of this operation is, to collect the various branches of their business

business diffused through the books, into a concise abstract; to ascertain their gain or loss since the last balance; and exhibit the present state of their funds. If the business be of such a kind, that most of the branches naturally come to an issue at a certain time of year, that time is the proper one for making the balance. Otherwise the end of the year, or the least busy time, may be chosen.

§ 47. It is proper, before balancing, to settle as many personal accounts as possible; to clear all arrears and small charges; to take an exact inventory of the goods on hand, as far as can be done; and affix a moderate value to each article, according to the current prices at the time; such a value as the owner would be willing at present to buy for. It is much more proper to value the goods on hand in conformity to the current prices, than at prime cost: For the design of affixing any value is to point out the gain or loss; and the gain is in reality obtained so soon as the prices rise, or the loss suffered so soon as they fall.

§ 48. These things being done, proceed to make the balance as follows: Prepare two sheets of paper, ruled with money-columns, in the form of Dr. and Cr.; write *Profit and Loss* as the title of the first, and *Balance* as the title of the second.

Prepare also some paper for computing the balances, and mark down the folios, titles, and sums of each account in the ledger, in a regular order. If a trial-balance was made, the sums may be transcribed from it. Pass by such accounts as are already closed; also the accounts of Stock and Profit and Loss, which are always the last of being balanced. Then subtract the lesser sum from the greater, and enter the difference on that sheet which the nature of the article points out, and on the side which corresponds to the greater sum of the account. More particularly,

In personal accounts, enter the difference, which is the debt owing to you, or by you, on the proper side of the balance sheet.

In the cash account, enter the difference, which is the money in hand, on the Dr. side of the balance-sheet.

In accounts of goods or other property, if there be nothing remaining on hand, enter the difference, which is the gain or loss, on the proper side of the profit and loss sheet.

If the whole be still on hand, enter the present value on the Dr. of the balance sheet; and if this be different from the prime cost, charges included, enter the difference in the proper side of the profit and loss sheet.

If part be sold, and part on hand, place the value of the quantity on hand under the sum of the Cr. and add them. The sum is the whole return that will be obtained, if the rest of the goods be sold at the estimated value; and this being compared with the sum of the Dr. which is the whole expence, shows the gain or loss. Enter the same in the proper side of the profit and loss sheet, and
enter

enter the quantity and value on hand on the Dr. of the balance-sheet.

Observe if the quantities in the inner columns be equal on both sides, when the goods are all sold: Or if the difference when only part is sold, be equal to the quantity on hand. If they correspond, you have a just accompt of the goods. If the Dr. be greater, there is something amissing, which you must enter on the Dr. of the balance-sheet, and mark the cause of the deficiency as waste, or the like. If the Cr. be greater, there is an excess which you must enter on the Cr. of the balance-sheet, together with the occasion of it, as difference of measure, or the like.

In accompts subsidiary to profit and loss, enter the difference on the proper side of the profit and loss sheet.

§ 49. When you have collected all the balances, add both sheets, and add to the Profit and Loss sheet the sums of the Profit and Loss accompt in the ledger: Then subtract the lesser sum of each sheet from the greater.

This being done, mark the sums of the stock accompt on your computation-paper, and add the balance of the profit and loss sheet to the proper side. Then subtract the lesser sum from the greater. The remainder will be equal to the difference of the sides of the balance-sheet, if the books be right, and the balances exactly collected.

§ 50. We shall prove that this equality must always hold, from the nature of the articles collected. The Dr. of the balance-sheet contains every kind of property belonging to you, and every debt owing to you; and the Cr. contains every debt owing by you: Therefore the difference of the sides exhibits your nett estate. The profit and loss sheet, when the articles from the ledger are included, contains every thing you have gained on the Cr. and every thing you have lost on the Dr.; and the difference of the sides is your nett gain or loss. The stock accompt contained your effects and debts at the time the books were opened; and, therefore, when the gain or loss is added to the proper side, it must show the extent of your nett estate at present. Thus the stock accompt and the balance-sheet both point out how much you are worth at present; the one from your former stock, allowance being made for your gains or losses; the other from a view of your present effects and debts; and they will correspond, because both must be agreeable to the truth, if the books be correct.

§ 51. Though the books must balance, if free from error, yet it is sometimes difficult to adjust them exactly, especially when the business is extensive, and the error trifling. If there be still a difference, which we do not think it worth while to make further search for, we may close the books, by making Profit and Loss Dr. or Cr. for the same. This introduces an article on one side of the ledger,

ledger, which has none corresponding to it on the other, but is balanced by some undiscovered error.

§ 52. The balance being struck, your next work is to close the books. Every article in the ledger should be posted from the journal: therefore the most regular way of finishing both is by inserting the following articles in the journal, and posting them in the common manner to the ledger.

1st, *Profit and Loss Dr. to Sundries, for loss, on the following accmpts.* The particulars are taken from the Dr. of the Profit and Loss-sheet.

2d, *Sundries Dr. to Profit and Loss, for gain on the following accmpts.* The particulars are taken from the Cr. of the Profit and Loss-sheet.

3d, *Balance-accmpt Dr. to Sundries, for debts and property belonging to me.*

4th, *Sundries Dr. to Balance-accmpt, for debts due by me.* The particulars of this and the former are taken from the respective sides of the Balance-sheet.

5th, *Profit and Loss Dr. to Stock for nett gain, or*

Stock Dr. to Profit and Loss for nett loss.

6th, *Balance-accmpt Dr. to Stock for nett stock.*

§ 53. When the four first of these articles are posted in the ledger, all the personal, real, and subsidiary accmpts will balance, and you may add them as you go along. In accmpts of goods, if there be any deficiency, you must enter it on the Cr. in the inner column; and if there be any outcome, you must enter it on the Dr. before you add the accmpt. Then the sums of every accmpt and every column on the opposite sides will be equal.

The only accmpts that remain open are, *Profit and Loss, Stock and Balance.* The fifth post balances the profit and loss accmpt, and the sixth balances the stock accmpt. It was noticed, § 14. that the whole sums of Dr. and Cr. of the ledger are equal; and therefore, if the sides of every accmpt, except one, be balanced, that one will balance of its own accord. The balance-accmpt alone remains open, and, upon trial, you will find that the sides are equal. This affords an additional proof, or at least a different view, of what was demonstrated with respect to the balance of the books in § 51.

The lines above and under the sums, at a general balance, may be drawn with red ink; and, at the balancing of particular accmpts, with black ink, for distinction.

§ 54. Thus is the state of a person's affairs brought together, in a short compass, under his view; and the articles of the balance-sheet supply materials for a new inventory. It is convenient, however, to alter the order, and arrange the real accmpts together, and the personal ones together.

Edinburgh, JANUARY 1. 1774.

✓ INVENTORY of ready money, goods, and debts,
belonging to James Ofwald merchant in Edinburgh.

Ready money	-	-	L. 75	10	-
200 bolls meal, at 13s.	L. 130	-	-	-	-
6 hds. Port-wine, at L. 15	90	-	-	-	-
70 reams paper, at 10s. 6d.	36	15	-	-	-
120 sp. five hank yarn, at 2s. 3d.	13	10	-	-	-
			270	5	-
A house in Lawn-market Edin. value	300	-	-	-	-
James Bofwell, merchant Edin.					
owes per accompt	L. 73	4	-	-	-
Thomas Pirie, writer Edin.					
owes per do.	12	3	8		
Henry Hardy, merchant Glas-					
gow, per bill	75	-	-	-	-
David Miller, manufacturer					
Hadington, per receipt	18	-	-	-	-
			178	7	8
§ 28					

824 2 8

LIST of debts by the said James Ofwald.

✓ To the Royal Bank, per accompt	L. 230	-	-		
To Tho. Smith, merchant London, per do.	54	-	-		
To Will. Nisbet, carpenter Leith, per do.	28	7	3		
				312	7 3
§ 28					
	3	-	-		
✓ Bought for ready money 105 yards calicoe, at 3s. 2d.				16	12 6
Rule III.					
✓ Sold James Cuthbert, merchant Leith, 50 bolls meal,					
at 13s. 3d.	-	-	-	33	2 6
Rule I.					
	5	-	-		
✓ Bartered 60 spindles five hank yarn, at 2s. 4d. for 80					
yards diaper, at 1s. 9d.	-	-	-	7	-
Rule III.					
	10	-	-		
✓ Paid William Nisbet in full	-	-	-	28	7 3
Rule I.					

Edin-

Edinburgh, JANUARY 1. 1774.

Sundries Dr. to Stock for articles belonging to James
Oswald merchant Edinburgh,

.1	Cash on hand	-	-	L. 75	10	-			
.2	Meal, for 200 bolls, at 13s. L.	130	-	-					
.2	Port-wine, for 6 hds. at L.	15	90	-	-				
.2	Paper, for 70 reams, at 10s. 6d.	36	15	-					
.2	Yarn, for 120 sp. five hank, 2s 3d	13	10	-					
					275	5	-		
.2	House in Lawn-market Edin. value	300	-	-					
.3	James Boswell, merchant Edin.								
	per account	L. 73	4	-					
.3	Thomas Pirie, writer, Edin. per								
	ditto	12	3	8					
.3	Henry Hardy, merchant Glas-								
	gow, per bill	75	-	-					
.3	David Miller, manufacturer								
.1	Haddington, per receipt	18	-	-					
					178	7	8		
							824	2	8

.1 Stock Dr. to Sundries,

.3	To Royal Bank, due them per accompt	L. 230	-	-					
.4	To Tho. Smith, merch. London, per acc.	54	-	-					
.4	To Will. Nisbet, carpenter Leith, per do.	28	7	3					
							312	7	3

.4	Calicoes Dr. to Cash, bought 105 yards, at 3s. 2d.				16	12	6		
----	--	--	--	--	----	----	---	--	--

.4	James Cuthbert merchant Leith, Dr. to Meal, sold								
.2	50 bolls, at 13s. 3d.				33	2	6		

.4	Diaper Dr. to Yarn, delivered 60 sp. five hank, at								
.2	2s. 4d. in barter for 80 yards, at 1s. 9d.				7	-	-		

.4	William Nisbet Dr. to Cash, paid him in full				28	7	3		
----	--	--	--	--	----	---	---	--	--

Edinburgh, JANUARY 13. 1774.

✓	Bought from Will. Bruce, merchant Leith, 200 bushels falt, at 1s. 8d	L. 16	13	4	
	320 stoncs iron, at 3s. 4d.	-	53	6	8
	Rule II.				70
	15.				
✓	Sold 30 reams papert to Ja. Boswell, at 12s. L. 18	—	—		
	12 to John Henderson, stationer Edinburgh, at 12s.	-	7	4	—
	5 for ready money, at 11s.	-	2	15	—
	47				27 19
	Rules I. III.				
	18.				
✓	Sold William Hunter, merchant Dunbar, 150 bush. falt, at 1s. 9d. L. 13 : 2 : 6				
	Received in part	-	L. 10	—	—
	And he owes the balance	-	3	2	6
	Rules I. III.				13 2 6
	22.				
✓	Received from Henry Hardy in payment of his bill	-	L. 75	—	—
	And for interest on ditto	-	2	10	—
	Rules II. VII.				77 10
✓	Paid the Royal Bank	-	-	-	100
	Rule I.				
	26.				
✓	Bought from Alexander Sharp, merch. Dundee, 500 sp. four hank yarn, at 1s. 11d. L. 47 : 18 : 4				
	Paid him in part	-	L. 15	—	—
	And the balance due him is	-	32	18	4
	Rules II. III.				47 18 4
	30.				
✓	Received 150 bolls meals, 13s. 2d. L. 98 : 15s. in bar- ter for 6 hds. Port-wine, at L. 16 L. 96	—	—		
	Paid the balance	-	2	15	—
	Rule III.				98 15
	Edin-				

Edinburgh, 13. JANUARY 1774.

<i>Sundries Drs. to William Bruce, merchant Leith,</i>						
.4	Salt, for 200 bushels, at 1s. 8d.	L. 16	13	4		
.5	Iron, for 320 stenes, at 3s. 4d.	-	53	6	8	
.5						70 — —
15.						
<i>Sundries Dr. to Paper.</i>						
.3	James Boswell, for 30 reams, at 12s.	L. 18	—	—		
.5	John Henderson, stationer Edinburgh, for 12	12s.	7	4	—	
.1	Cash, for 5	11s.	2	15	—	
.2						27 19 —
	47					
	18.					
<i>Sundries Drs to Salt for 150 bush. at 1s. 9d.</i>				L. 13	2	6
.1	Cash, received in part	-	L. 10	—	—	
.5	William Hunter, merchant Dunbar, for					
.4	balance due by him	-	3	2	6	
						13 2 6
22.						
.1	<i>Cash Dr. to Sundries.</i>					
.3	To Henry Hardie, rec. payment of his bill	L. 75	—	—		
.1	To Profit and Loss, received interest on do.	2	10	—		
						77 10 —
.3	Royal Bank Dr. to Cash, paid them	-				100 — —
.1						
26.						
.2	Yarn Dr. to Sundries, for 500 spindles four hank, at 1s. 11d.	L. 47	18	4		
.1	To Cash, paid in part	-	L. 15	—	—	
.5	To Al. Sharp merch. Dundee, for balance	32	18	4		
						47 18 4
30.						
.2	Meal Dr. to Sundries, for 150 bolls, at 13s 2d	L. 98	15	s.		
.2	To Port-wine, for 6 hds. delivered in barter, L. 16	-	L. 96	—	—	
.1	To Cash, paid balance	-	2	15	—	
						98 15 —
	O o 2					Edin-

Edinburgh, 1. FEBRUARY 1774.

✓ Sold James Boswell				
48 bush. falt, being the rem. at 1s. 8½d.	L. 4	2	—	
60 sp. five hank yarn, at 2s. 3½d.	6	17	6	
100 stons iron, at 3s. 4½d.	16	17	6	
Rule I.				27 17 —
3.				
✓ Received from James Cuthbert in part	—			30 — —
Rule II.				
10.				
✓ Bartered 22 reams paper, at 12s.	L. 13	4	—	
30 bolls meal, at 13s. 6d.	20	5	—	
	L. 33	9	—	
For 334½ sp. four hank yarn, at 2s.				33 9 —
Rule III.				
✓ Taken for the use of my shop the remaining ream paper, value	—			— 10 6
Rule VI.				
15.				
✓ Received from William Hunter in full	L. 3	2	6	
from James Boswell in part	70	—	—	
Rule II.				73 2 6
✓ Paid the Royal Bank	—			100 — —
Rule I.				
19.				
✓ Bartered 100 yards calicoes, at 3s. 6d.	L. 17	10	—	
For one hd. Port-wine	L. 14	10	—	
Received the balance	3	—	—	
Rule III.				17 10 —
✓ Sold 30 bolls meal for ready money,				
at 13s. 8d.	L. 20	10	—	
45 to Henry Hardy, at 13s. 10d.	31	2	6	
27 to William Hunter, at 13s. 10d.	18	13	6	
52 to Baillie and Bell, Borrow-				
stounness, at 13s. 10d.	35	19	4	
154				106 5 4
Rules I. III.				
Edin-				

Edinburgh, 1. FEBRUARY 1774.

<i>James Boswell Dr. to Sundries,</i>		
.3	To Salt, for 48 bush. being the rem.	
.4	at 1s. 8½d.	L. 4 2 —
.2	To Yarn, for 60 sp. five hank, at 2s. 3½d.	6 17 6
.5	To Iron, for 100 stoncs, at 3s. 4½d.	16 17 6
	3.	27 17 —
.1	Cash Dr. to James Cuthbert, received in part	30 — —
.4	10.	
.2	Yarn Dr. to Sundries, for 334½ sp. four hank yarn,	
	at 2s. L. 33 : 9 s.	
.2	To Paper, for 22 reams, at 12s.	L. 13 4 —
.2	To Meal, for 30 bolls, at 13s. 6d.	20 5 —
	Delivered in barter.	33 9 —
.5	Charges Merchandize Dr. to Paper, taken for the	
.2	use of shop, 1 ream, value	— 10 6
	15.	
.1	Cash Dr. to Sundries,	
.5	To William Hunter, received in full	L. 3 2 6
.3	To James Boswell, ——— in part	70. — —
		73 2 6
.3	Royal Bank Dr. to Cash, paid them	100 — —
.1	19.	
	Sundries Dr. to Calicoes, for 100 yards delivered in	
	barter, at 3s. 6d. L. 17 : 10 s.	
.2	Port-wine, for 1 hd.	L. 14 10 —
.1	Cash, received balance	3 — —
.4		17 10 —
	<i>Sundries Drs. to Meal,</i>	
.1	Cash, for 30 bolls, 13s. 8d. L. 20 10 —	
.3	Henry Hardy, for 45 13s. 10d. 31 2 6	
.5	William Hunter, for 27 13s. 10d. 18 13 6	
.5	Baillie and Bell, Bor-	
.2	rowstounnefs, for 52 13s. 10d. 35 19 4	
	154	106 5 4
	Edin-	

Edinburgh, 22. FEBRUARY 1774.

/ Drawn on the Royal Bank	-	-	120	-	-
Rule II.					

/ Paid William Bruce in part	-	L. 50	-	-	
Alexander Sharp in full	-	32	18	4	
And Tho. Smith's bill on me at sight		35	-	-	
					117 18 4
Rule I.					

Edinburgh, 1. MARCH 1774.

/ Paid charges and cellar-rent of falt	L. 1	2	6		
charges and granary-rent of meal	3	3	-		
					4 5 6
Rule IV.					

/ Received from Thomas Pirie in full	L. 12	-	-		
Abated him	-	-	3	8	
					12 3 8
Rules II. VI.					

/ Sold James Dalton, Manchester,					
60 spindles 4 hank yarn, at 2s. $\frac{1}{4}$ d.	L. 6	1	3		
300 do. do. at 1s. $11\frac{1}{4}$ d.	29	13	9		
					35 15 -
Rule I.					

/ Received from Jan Jonkheer, Rotterdam, 6 bags					
clover-feed, qt. 200 lb. each, amount per invoice,					
f. 3 12, at 22d. per f.	-	L. 28	12	-	
Paid freight and charges	-	1	5	-	
					29 17 -
Rules II. IV.					

/ Bartered with James Boswell 2 bags clover-feed, at					
L. 6, L. 12; for 2 hds. linfeed, at 55s.	L. 5	10	-		
Received in money	-	5	-	-	
And he owes the balance	-	1	10	-	
					12 - -
Rules III. I.					

/ Paid Tho. Smith in full	-	L. 19	-	-	
And for interest	-	1	10	-	
					20 10 -
Rules I. VI.					

Edin-

Edinburgh, 22. FEBRUARY 1774.

.1	Cash Dr. to Royal Bank, drawn on them		120	—	—
.3					
	<i>Sundries Dr. to Cash,</i>				
.5	William Bruce, paid him in part	L. 50	—	—	
.5	Alex. Sharp, paid him in full	—	32	18	4
.4	Tho. Smith, paid his bill on me at sight	35	—	—	
.1			117	18	4

Edinburgh, 1. MARCH 1774.

	<i>Sundries Drs. to Cash,</i>				
.4	Salt, paid charges and cellar-rent	L. 1	2	6	
.2	Meal, paid charges and granary-rent	3	3	—	
.1			4	5	6
	<i>Sundries Drs. to Thomas Pirie,</i>				
.1	Cash, received in full	L. 12	—	—	
.1	Profit and Loss, abated him	—	3	8	
.3			12	3	8
	<i>James Dalton, Manchester, Dr. to Yarn,</i>				
.6	For 60 sp. 4 hank, at 2s. $\frac{1}{4}$ d.	L. 6	1	3	
.2	And 300 do. at 1s. 11 $\frac{1}{4}$ d.	—	29	13	9
	360		35	15	—
	<i>Clover-feed Dr. to Sundries,</i>				
.6	To J. Jonkheer, Rotterd. for 6 bags, qt. 200 lb. each, is				
.6	1200 lb. amount p. inv. f. 3 12, at 22d.	L. 28	12	—	
.1	To Cash, paid freight and charges	1	5	—	
			29	17	—
	<i>Sundries Drs. to Clover-feed, for 2 bags, at L. 6, L. 12</i>				
.6	Linseed, for 2 hds. reed. in barter, 55s.	L. 5	10	—	
.1	Cash, in part	—	5	—	
.3	James Boswell, for balance	—	1	10	—
.6			12	—	—
	<i>Sundries Drs. to Cash,</i>				
.4	Thomas Smith, paid him in full	L. 19	—	—	
.1	Profit and Loss, paid him interest	1	10	—	
.1			20	10	—

Edinburgh, 21. MARCH 1774.

Sold 140 lb. clover-feed to John Scott farmer at
 Haugh-head, at $7\frac{1}{2}$ d. L. 4 7 6
 70 to James Cuthbert, at $7\frac{1}{2}$ d. 2 3 9
 120 for ready money, at $7\frac{1}{4}$ d. 3 12 6

330

Rules I. III.

James Boswell has paid the Royal Bank on my accompt
 Rule VIII.

Bought from William Ainflic merchant Alloa $\frac{1}{3}$ share
 of the ship Hazard, for - -

Rule II.

Sold Baillie and Bell,
 150 stone iron, at 3s. 7d. L. 26 17 6
 1 hd. Port-wine - 15 5 -

Rule I.

Edinburgh, 2. APRIL 1774.

Sold for ready money
 50 yards diaper, at 1s. 11d. - L. 4 15 10
 30 bolls meal, at 13s. 7d. - 20 7 6
 1 hd. linfeed, - 3 3 -
 160 lb. clover-feed, at $7\frac{3}{4}$ d. - 5 3 4
 30 stone iron, at 3s. $6\frac{1}{2}$ d. - 5 6 3

Rule III.

Drawn on the Royal Bank for
 Rule II.

Bought for ready money
 30 casks train oil, at 22s. - L. 33 - -
 30 bolls meal, at 13s. L. 19 10 -
 40 do. at 13s. 2d. 26 6 8

70

Rule III.

Edin-

Edinburgh, 21. MARCH 1774.

<i>Sundries Drs to Clover-feed,</i>					
.6	John Scott farmer at Haugh-head, for	140 lb. at 7½d	L 4	7	6
.4	James Cuthbert for	70 7½d	-	2	3 9
.1	Cash, for	120 7½d	-	3	12 6
.6					
		330			
		24.			
.3	Royal Bank Dr. to James Boswell, paid them by him		40	—	—
.3					
		25.			
.6	Share of ship Hazard Dr. to William Ainslie merchant				
.7	Alloa, bought ½ share for	- - -	150	—	—
		28.			
.5	Baillie and Bell Drs to Sundries.				
.5	To Iron, for 150 stone, at 3s. 7d.		L. 26	17	6
.2	To Port Wine, for 1 hd.	- -	15	5	—
			42	2	6

Edinburgh, 2. APRIL 1774.

<i>Cash Dr. to Sundries,</i>					
.1	To Diaper, for 50 yards, at 1s. 11d.		L. 4	15	10
.4	To Meal, for 30 bolls, at 13s. 7d.		20	7	6
.2	To Linseed, for 1 hd.	- -	3	3	—
.6	To Clover-feed, for 160 lb. at 7½d.	-	5	3	4
.6	To Iron, for 30 stone, at 3s. 6½d.		5	6	3
.5					
			38	15	11
		5.			
.1	Cash Dr. to Royal Bank, drawn on them for		60	—	—
.3					
<i>Sundries Drs. to Cash.</i>					
.7	Train-oil, for 30 casks, at 22s.		L. 33	—	—
.2	Meal, for 30 bolls, at 13s.	L. 19	10	—	—
.1	40 at 13s. 2d.	26	6	8	
			45	16	8
	70				
			78	16	8

Edinburgh, 5. APRIL 1774.

✓ Sold Will. Ainslie 30 yds. diaper, at 2s. L. 3 — —			
And paid him — — — 30 — —			
Rule I.	33	—	—
8.			
✓ Baillie and Bell have paid Will. Ainslie, at my desire, balance of my share of the ship Hazard	117	—	—
Rule VIII.			
11.			
✓ Sold James Boswell 20 casks train-oil, at 27s.	27	—	—
Rule I.			
14.			
✓ Sold George Gordon merchant Stirling			
10 casks train-oil, at 28s. L. 14 — —			
1 hd. linseed — — — 3 5 —			
35 bolls meal, at 13s. 8d. — — 23 18 4			
L. 41 3 4			
Received in part — — — L. 35 — —			
And he owes the balance — — — 6 3 4			
Rules I. II. and § 27.	41	3	4
16.			
✓ Paid Baillie and Bell's bill on me to C. Cowan, at St.	38	18	2
Rule I.			
18.			
✓ Taken for the use of my family the remaining 5 yds. calicoe, at 3s. 2d. — — — —	—	15	10
Rule VI.			
22.			
✓ The Royal Bank have paid Jan Jonkheer's bill on me, 1 mdt. at my desire — — —	28	12	—
Rule VIII.			
25.			
✓ Received my proportion of profits on a voyage to Rotterdam by the Hazard — — —	33	—	—
Rule V.			
30.			
✓ Paid for small charges on my business since 1st January — — — L. 5 3 8			
Personal and family-expences — — — 32 — —			
Rule VI.	37	3	8
Edin.			

Edinburgh, 5. APRIL 1774.

<i>William Ainslie Dr. to Sundries</i>				
.7	<i>To Diaper, for 30 yards, at 2s.</i>	L. 3 — —		
.4	<i>To Cash, paid him</i>	30 — —	33	—
.1		8. — —		
<i>William Ainslie Dr. to Baillie and Bell paid him, by them, on my accompt, being balance of my share of ship Hazard</i>			117	—
.7		11. — —		
.5	<i>James Boswell Dr. to Train-oil fold him 20 casks, at 27s.</i>		27	—
.3		14. — —		
.7	<i>George Gordon merchant Stirling, Dr. to Sundries.</i>			
.7	<i>To Train-oil, for 10 casks, at 28s.</i>	L. 14 — —		
.6	<i>To Linseed, for 1 hd.</i>	3 5 —		
.2	<i>To Meal, for 35 bolls at 13s. 8d.</i>	23 18 4	41	3 4
.1	<i>Cash Dr. to George Gordon, received in part</i>		35	—
.7				
		16. — —		
.5	<i>Baillie and Bell Dr. to Cash, paid their bill on me to C. Cowan, at St.</i>		38	18 2
.1		18. — —		
.7	<i>Proper Expences Dr. to Calicoes, for 5 yards taken for family-use, at 3s. 2d.</i>		—	15 10
.4		22. — —		
.6	<i>Jan. Jonkheer Dr. to Royal Bank, for his bill on me 1 mdt. paid by them</i>		28	12 —
.3		25. — —		
.1	<i>Cash Dr. to Share of ship Hazard, Received my proportion of profits on a voyage to Rotterdam,</i>		33	—
.6		30. — —		
	<i>Sundries Drs. to Cash.</i>			
.5	<i>Charges Merchandize, paid small charges since Jan. 1.</i>	L. 5 3 8		
.7	<i>Proper Expences, paid personal and family charges</i>	32 — —	37	3 8
.1				

Edinburgh, 30. APRIL 1774.

/ Due Thomas Sharp, my clerk, for wages Rule VI.	-	8	—	—
/ Due the Royal Bank for interest Rule VI.	- -	2	11	2
Previous to the balancing of my books, I have taken an inventory of the goods in my shop and ware- house,				
124 bolls meal, at 13s. 6d.	-	L. 83	14	—
474 sp. four hank yarn, at 2s.	-	47	8	—
40 stone iron, at 3s. 4d.	- -	6	13	4
300 lb. clover-feed, at 6d.	- -	7	10	—
		L. 145	5	4
I value my house at	- - -	300	—	—
And my share of ship Hazard	-	140	—	—
		L. 585	5	4

In the foregoing specimen, which contains only articles that may be journalized by the rules in this chapter, the waste-book and journal are placed on opposite pages, that the learner may easily compare them, and the rules are referred to by their numbers.

It is not necessary to begin new books after balancing, nor to open the accompts anew, unless the old folios be full. The accompts may be continued in the former folios; but it is best to begin a new ledger, if the old one be not likely to hold all the business of the next year. When one comes to have several sets of books, it is common to distinguish them by the letters of the alphabet. The first waste-book, journal, and ledger, are marked A, the second B; and so on.

JOUR.

(7) 30x

5	Charges Merchandize Dr. to Thomas Sharp, my clerk.					8			
7	due him for wages	-	-	-	-				
1	Profit and Loss Dr. to Royal Bank, due them for int.						2	11	2
3	Profit and Loss Dr. to Sundries, for articles of loss								
1	To Salt	-	-	-	-	L. 11	4		
4	To Charges Merchandize	-	-	-	-	13	14	2	
5	To Proper Expenses	-	-	-	-	32	15	10	
7	See § 52								
	Sundries Drs. to Profit and Loss, for articles of gain								
2	Meal	-	-	-	-	L. 9	18	-	
2	Port-wine	-	-	-	-	6	15	-	
2	Paper	-	-	-	-	4	18	6	
2	Yarn	-	-	-	-	2	3	2	
4	Calicoes	-	-	-	-	1	13	4	
4	Diaper	-	-	-	-	-	15	10	
5	Iron	-	-	-	-	2	7	11	
6	Clover-seed	-	-	-	-	5	-	1	
6	Linseed	-	-	-	-	-	18	-	
6	Share of Ship Hazard	-	-	-	-	23	-	-	
7	Train-oil	-	-	-	-	8	-	-	
1									
7	Balance-Accompt Dr. to Sundries, for articles belonging to me.								
1	To Cash	-	-	-	-	L. 8	3	10	
2	To Meal, for 124 bolls, at 13s. 6d.					83	14	-	
2	To Yarn, for 474 sp. at 2s.					47	8	-	
	amissing $\frac{1}{2}$ spindle.								
2	To House in Lawn-market	-	-	-	-	300	-	-	
3	To James Boswell	-	-	-	-	37	11	-	
3	To Henry Hardy	-	-	-	-	31	2	6	
3	To David Miller	-	-	-	-	18	-	-	
4	To James Cuthbert	-	-	-	-	5	6	3	
5	To Iron, for 40 stone, at 3s. 4d.	-	-	-	-	6	13	4	
5	To John Henderson	-	-	-	-	7	4	-	
5	To William Hunter	-	-	-	-	18	13	6	
6	To James Dalton	-	-	-	-	35	15	-	
6	To Clover-seed, for 300 lb. at 6d.					7	10	-	
	deficiency 10 lb.								
6	To John Scott	-	-	-	-	4	7	6	
6	To Share of Ship Hazard	-	-	-	-	140	-	-	
7	To George Gordon	-	-	-	-	6	3	4	

Edinburgh, 30. APRIL 1774.

Sundries Drs. to Balance Account			
2	Meal. Outcome 3 bolls		
3	Royal Bank	L. 201	3 2
5	William Bruce	20	— —
7	Thomas Sharp	8	— —
7			229 3 2
1	Profit and Loss Dr. to Stock for nett gain	-	16 13 8
1	Stock Dr. to Balance Account, for nett stock	-	528 9 1
7			

The next JOURNAL would begin thus.

Sundries Drs. to Stock.

Cash on hand	-	-	L. 8	3	10
Meal, for 124 bolls, at 13s.	L. 83	14	—		
Yarn, for 474 sp. fourhank, at 2s. 47	8	—			
Iron, for 40 stone, at 3s. 4d.	6	13	4		
Clover-feed, for 300 lb. at 6d.	7	10	—		
			145	5	4
House in Lawn-market Edinburgh, value	-	L. 300	—		
Share in ship Hazard. For one third	-	-	140	—	
			440	—	
James Boswell Edinburgh, due by him	-	L. 37	11	—	
Henry Hardy Glasgow, do.	31	2	6		
David Miller Haddington, do.	18	—	—		
James Cuthbert Leith, do.	5	6	3		
John Henderson Edinburgh, do.	7	4	—		
William Hunter Dunbar, do.	18	13	6		
James Dalton Manchester, do.	35	15	—		
John Scott Haugh-head, do.	4	7	6		
George Gordon Stirling, do.	6	3	4		
			164	3	1
					757 12 3

Stock Dr. to Sundries.

To Royal Bank, due them	L. 201	3	2
To William Bruce Leith, due him	20	—	—
To Thomas Sharp, my clerk, do.	8	—	—
			229 3 2

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LEDGER

		Dr.	Stock		For			
1774	Jan.	1	To Sundries per J.	-	-	312	7	3
	Apr.	30	To Balance-accompt, for nett stock	-	7	528	9	1
						840	16	4
		Dr.	Profit and Loss					
1774	Mar.	4	To Thomas Pirie, abated him	-	3		3	8
	Apr.	17	To Cash, paid Tho. Smith interest	-	1	1	10	-
		30	To Royal Bank, for interest due them	-	3	2	11	2
			To Sundries, per J.	-		47	1	4
			To Stock, for nett gain	-	1	16	13	8
						67	19	10
		Dr.	Cash					
1774	Jan.	1	To Stock on hand	-	1	75	10	-
		15	To Paper, for 5 reams, at 11s.	-	2	2	15	-
		18	To Salt, in part, per J.	-	4	10	-	-
		22	To Sundries, for Hen. Hardie's bill, with int.	-		77	10	-
	Feb.	3	To James Cuthbert, in part	-	4	30	-	-
		15	To Sundries, per J.	-		73	2	6
		19	To Calicoes, for bal. of 100 yards, per J.	-	4	3	-	-
			To Meal, for 30 bolls, at 13s. 8d.	-	2	20	10	-
		22	To Royal Bank, drawn on them	-	3	120	-	-
	Mar.	4	To Thomas Pirie, in full	-	3	12	-	-
		17	To Clover-feed, in part, for 2 bags	-	6	5	-	-
		21	To Clover-feed, for 120 lb. at 7½ d.	-	6	3	12	6
	Apr.	2	To Sundries, per J.	-		38	15	11
		5	To Royal Bank, drawn on them	-	3	60	-	-
		14	To George Gordon, in part	-	7	35	-	-
		25	To Share of Ship Hazard for share profits p. J.	-	6	33	-	-
						599	15	11

LEDGER. A.

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		Contra	Cr.	Fo		
1774						
Jan.	1	By Sundries, per J.	-	824	2	8
Apr.	30	By Profit and Loss, for nett gain	-	16	13	8
				840	16	4
		Contra	Cr.			
1774						
Jan.	22	By Cash, received int. on Hen. Hardie's bill	-	2	10	—
Apr.	30	By Sundries per J.	-	65	9	10
				67	19	10
		Contra	Cr.			
1774						
Jan.	3	By Calicoes, for 105 yards, at 3s. 2d.	-	4	16	12 6
	10	By William Nisbet, in full	-	4	28	7 3
	22	By Royal Bank, paid them	-	3	100	—
	26	By Yarn, in part, for 500 sp. four hank	-	2	15	—
	30	By Meal, paid bal. of 150 bolls	-	2	2	15 —
Feb.	15	By Royal Bank, paid them	-	3	100	—
	22	By Sundries, per J.	-	117	18	4
Mar.	1	By Sundries, per J.	-	4	5	6
	12	By Clover-feed, paid freight and charges	-	6	1	5 —
	17	By Sundries, paid Tho. Smith, with int. per J.	-	20	10	—
Apr.	5	By Sundries, per J.	-	78	16	8
	—	By William Ainslie, paid him	-	7	30	—
	16	By Baillie and Bell, paid their bill on me ft.	-	5	38	18 2
	30	By Sundries, for charges and expences per J.	-	37	3	8
	—	By Balance-accompt	-	7	8	3 10
				599	15	11

<i>Dr.</i>		<i>Meal,</i>		<i>Bolls</i>		<i>For</i>			
1774									
Jan.	1	To Stock on hand, at 13s.	-	200	1	130	—	—	—
	30	To Sundries, per J. at 13s. 2d.	-	150		98	15	—	—
Mar.	1	To Cash, paid charges and granary-rent	-	—	1	3	3	—	—
Apr.	5	To Cash, per J.	-	70	1	45	16	8	—
	30	To Profit and Loss, for gain	-	—	1	9	18	—	—
		Outcome	-	3					
				423		287	12	8	—
<i>Dr.</i>		<i>Port-wine,</i>		<i>Hds.</i>					
1774									
Jan.	1	To Stock on hand, at L. 15	-	6	1	90	—	—	—
Feb.	19	To Calicoes, in barter	-	1	4	14	10	—	—
Apr.	30	To Profit and Loss, for gain	-	—		6	15	—	—
				7		111	5	—	—
<i>Dr.</i>		<i>Paper,</i>		<i>R.</i>					
1774									
Jan.	1	To Stock on hand, at 10s. 6d.	-	70	1	36	15	—	—
Apr.	30	To Profit and Loss, for gain	-	—	1	4	18	6	—
				70		41	13	6	—
<i>Dr.</i>		<i>Yarn,</i>		<i>Spindles.</i>					
				4 H.	5 H.				
1774									
Jan.	1	To Stock on hand, at 2s. 3d.	-	—	120	1	13	10	—
	26	To Sundries, per J. at 1s. 11d.	-	500	—	47	18	4	—
Feb.	10	To Sundries, per J. at 2s.	-	334 $\frac{1}{2}$	—	33	9	—	—
Apr.	30	To Profit and Loss, for gain	-	—	—	2	3	2	—
				834 $\frac{1}{2}$	120	97	—	6	—
<i>Dr.</i>		<i>House in Lawn-market,</i>							
1774									
Jan.	1	To Stock, for value	-	—	1	300	—	—	—

LEDGER. A.

(2) 307

		Contra	Cr.	For				
			Bolls					
1774	Jan.	3 By James Cuthbert, at 13s. 3d.	50	4	33	2	6	
	Feb.	10 By Yarn in barter, at 13s. 6d.	30	2	20	5	—	
		19 By Sundries, per J.	154		106	5	4	
	Apr.	2 By Cash, at 13s. 7d.	30	1	20	7	6	
		14 By George Gordon, at 13s. 8d.	35	7	23	18	4	
		30 By Balance-accompt, at 13s. 6d.	124	7	83	14	—	
			423		287	12	8	
		Contra	Cr.					
			Hds.					
1774	Jan.	30 By Meal, in barter, at L. 16	6	2	96	—	—	
	Mar.	28 By Baillie and Bell	1	5	15	5	—	
			7		111	5	—	
		Contra	Cr.					
			R.					
1774	Jan.	15 By Sundries, per J.	47		27	19	—	
	Feb.	10 By Yarn in barter, at 12s.	22	2	13	4	—	
		— By Charges Merchandize, for shop-use	1	5	—	10	6	
			70		41	13	6	
		Contra	Cr.					
			Spindles.					
			4 H. 5 H.					
1774	Jan.	5 By Diaper, at 2s. 4d.	—	60	4	7	—	
	Feb.	1 By James Boswell, at 2s. 3 $\frac{1}{2}$ d.	—	60	3	6	17	6
	Mar.	5 By James Dalton, per J.	360	—	6	35	15	—
	Apr.	30 By Balance-accompt, at 2s. Amiffing	474	—	7	47	8	—
			834 $\frac{1}{2}$	120		97	—	6
		Contra	Cr.					
1774	Apr.	30 By Balance-accompt		7	300	—	—	

				Fo			
<i>Dr.</i>		<i>Ja. Boswell, merch. Edinburgh,</i>					
1774							
Jan.	1	To Stock due by him per accompt		1	73	4	—
	15	To Paper, for 30 reams, at 12s.		2	18	—	—
Feb.	1	To Sundries per J.			27	17	—
Mar.	17	To Clover-feed, for bal. of 2 bags, per J.		6	1	10	—
Apr.	11	To Train oil, for 20 casks, at 27s.		7	27	—	—
						147	11
						—	—
<i>Dr.</i>		<i>Thomas Pirie, writer Edinburgh,</i>					
1774							
Jan.	1	To Stock due by him per accompt		1	12	3	8
						—	—
<i>Dr.</i>		<i>Henry Hardy, merch. Glasgow,</i>					
1774							
Jan.	1	To Stock due by him per bill		1	75	—	—
Feb.	19	To Meal, for 45 bolls, at 13s. 10d.		2	31	2	6
						—	—
<i>Dr.</i>		<i>Dav. Miller, manuf. Haddington,</i>					
1774							
Jan.	1	To Stock due by him, per receipt		1	18	—	—
						—	—
<i>Dr.</i>		<i>Royal Bank of Scotland,</i>					
1774							
Jan.	22	To Cash, paid them		1	100	—	—
Feb.	15	To Cash, paid them		1	100	—	—
Mar.	24	To Ja. Boswell, paid them by him		3	40	—	—
Apr.	30	To Balance-accompt		7	201	3	2
						—	—
						441	3
						—	2

LEDGER. A.

(3) 309

		Contra	Cr.	For			
1774							
Feb.	15	By Cash in part	- -	1	79	—	—
Mar.	24	By Royal Bank, paid in by him		3	40	—	—
Apr.	30	By Balance-accompt	- -	7	37	11	—
					147	11	—
		Contra	Cr.				
1774							
Mar.	4	By Sundries in full, with abatement, per J.			12	3	8
		Contra	Cr.				
1774							
Jan.	22	By Cash in full	- -	1	75	—	—
Apr.	30	By Balance-accompt	- -	7	31	2	6
		Contra	Cr.				
1774							
Apr.	30	By Balance-accompt	- -	7	18	—	—
		Contra	Cr.				
1774							
Jan.	1	By Stock, due them per accompt		1	230	—	—
Feb.	22	By Cash, drawn on them	-	1	120	—	—
Apr.	5	By Cash, drawn on them	- -	1	60	—	—
	22	By J. Jonkheer, for his bill pd. by them p. J.		6	28	12	—
	30	By Profit and Loss, for interest due them		1	2	11	2
					441	3	2

		Fo			
<i>Dr. Tho. Smith, merchant London,</i>					
1774					
Feb. 22	To Cash, paid his bill on me ft.	-	1	35	—
Mar. 17	To Cash, in full	-	1	19	—
				54	—
<i>Dr. Will. Nisbet, carpenter Leith,</i>					
1774					
Jan. 10	To Cash, paid him in full	-	1	28	7 3
<i>Dr. Calicoes,</i>					
1774					
Jan. 3	To Cash, at 3s. 2d.	-	105	1	16 12 6
Apr. 30	To Profit and Loss, for gain	-	1	1	13 4
			105	18	5 10
<i>Dr. Ja. Cuthbert, merchant Leith,</i>					
1774					
Jan. 3	To Meal, for 50 bolls, at 13s. 3d.	-	2	33	2 6
Mar. 21	To Clover-feed, for 70 lb. at 7½ d.	-	6	2	3 9
				35	6 3
<i>Dr. Diaper,</i>					
1774					
Jan. 5	To Yarn in barter, at 1s. 9d.	-	80	2	7 — —
Apr. 30	To Profit and Loss, for gain	-	1	—	15 10
			80	7	15 10
<i>Dr. Salt,</i>					
1774					
Jan. 13	To William Bruce, at 1s. 8d.	-	200	5	16 13 4
Mar. 1	To Cash, paid charges and cellar-rent	-	1	1	2 6
			200	17	15 10

		Contra	Cr.			
1774	Jan. 1	By Stock, due him per accompt	-	1	54	—
					54	—
		Contra	Cr.			
1774	Jan. 1	By Stock, due him per accompt	-	1	28	7 3
		Contra	Cr.			
1774	Feb. 19	By Sundries, per J. at 3s. 6d.	-	100	17	10 —
Apr. 18	By Proper Expences taken at 3s. 2d.	-	5	7	—	15 10
				105	18	5 10
		Contra	Cr.			
1774	Feb. 3	By Cash, in part	-	1	30	—
Apr. 30	By Balance-accompt	-	-	7	5	6 3
					35	6 3
		Contra	Cr.			
1774	Apr. 2	By Cash, at 1s. 11d.	-	1	4	15 10
	5	By William Ainlie, at 2s.	-	30	3	—
				80	7	15 10
		Contra	Cr.			
1774	Jan. 18	By Sundries, per J. at 1s. 9d.	-	150	13	2 6
Feb. 1	By Ja. Boswell, for the rem. at 1s. 8½d.	-	48	3	4	2 —
Apr. 30	By Profit and Loss, Deficiency	-	—	1	11	4
				200	17	15 10

<i>Dr.</i>		<i>Iron,</i>	<i>Stones.</i>	<i>£</i>	<i>s</i>	<i>d</i>
1774						
Jan.	13	To William Bruce, at 3s. 4d.	320	5	53	6
Apr.	30	To Profit and Loss, for gain -		1	2	7
			320		55	14
						7
<i>Dr.</i>		<i>William Bruce, merchant Leith,</i>				
1774						
Feb.	22	To Cash in part -		1	50	—
Apr.	30	To Balance-accompt -		7	20	—
					70	—
<i>Dr.</i>		<i>Jo. Henderson, stationer Edin.</i>				
1774						
Jan.	15	To Paper, for 12 reams, at 12s. -		2	7	4
<i>Dr.</i>		<i>Will. Hunter, merchant Dunbar,</i>				
1774						
Jan.	18	To Salt, for balance of 150 bush. per J.		4	3	2
						6
Feb.	19	To Meal, for 27 bolls, at 13s. 10d.		2	18	13
						6
<i>Dr.</i>		<i>Alex. Sharp, merchant Dundee,</i>				
1774						
Feb.	22	To Cash, in full -		1	32	18
						4
<i>Dr.</i>		<i>Charges Merchandize,</i>				
1774						
Feb.	10	To Paper, taken for shop-use, 1 ream		2	—	10
						6
Apr.	30	To Cash, for small charges since 1st Jan.		1	5	3
		To Tho. Sharp, for wages -		7	8	—
					13	14
						2
<i>Dr.</i>		<i>Baillie and Bell, Borrowstounness,</i>				
1774						
Feb.	19	To Meal for 52 bolls, at 13s. 10d.		2	35	19
						4
Mar.	28	To Sundries, per J. -			42	2
						6
Apr.	16	To Cash, paid their bill on me to C. Cowan, ft.		1	38	18
						2
					117	—

		Contra	Cr.	Fo			
			Stones.				
1774	Feb. 1	By James Boswell, at 3s. 4½d.	- 100	3	16	17	6
	Mar. 28	By Baillie and Bell, at 3s. 7d.	- 150	5	26	17	6
	Apr. 2	By Cash, at 3s. 6½d.	- 30	1	5	6	3
	30	By Balance-accompt, at 3s. 4d.	40	7	6	13	4
			320		55	14	7
		Contra	Cr.				
1774	Jan. 13	By Sundries per J.	- -		70	-	-
					70	-	-
		Contra	Cr.				
1774	Apr. 30	By Balance-accompt	- -	7	7	4	-
		Contra	Cr.				
1774	Feb. 15	By Cash in full	- -	1	3	2	6
	Apr. 30	By Balance-accompt	- -	7	18	13	6
		Contra	Cr.				
1774	Jan. 26	By Yarn, for bal. of 500 spindles, per J.		2	32	18	4
		Contra	Cr.				
1774	Apr. 30	By Profit and Loss	- -	1	13	14	2
					13	14	2
		Contra	Cr.				
1774	Apr. 8	By William Ainslie, paid him by them		7	117	-	-
					117	-	-

		Fo			
Dr.	<i>James Dalton, Manchester,</i>				
1774					
Mar.	5 To Yarn, for 360 spindles four-hank, per J.	2	35	15	—
Dr.	<i>Clover-feed,</i>				
1774					
Mar.	12 To Sundries per J. for pr. cost and char.	1200	29	17	—
Apr.	30 To Profit and Loss, for gain	—	5	—	1
		1200	34	17	1
Dr.	<i>J. Jonkbeer, merch. Rotterdam,</i>				
1774					
Apr.	22 To Ro. Bank, for his bill on me paid by them	3	28	12	—
Dr.	<i>Linseed,</i>				
1774					
Mar.	17 To Clover-feed, in bart. at 55s.	2 6	5	10	—
Apr.	30 To Profit and Loss, for gain	— 1	—	18	—
		2	6	8	—
Dr.	<i>John Scott, farmer at Haugh-head,</i>				
1774					
Mar.	21 To Clover-feed, for L. 140 lb. at 7½d.	6	4	7	6
Dr.	<i>Share of ship Hazard,</i>				
1774					
Mar.	25 To William Ainslie, bought ½ share for	7	150	—	—
Apr.	30 To Profit and Loss	1	23	—	—
			173	—	—

		Contra	Cr.				
1774	Apr. 7	By Balance-accompt	- -	7	35	15	—
		Contra	Cr.				
1774	Mar. 17	By Sundries per J.	- 400		12	—	—
	21	By Sundries per J.	- 330		10	3	9
Apr.	2	By Cash, at $7\frac{3}{4}$	- 160	1	5	3	4
	30	By Balance-accompt, at 6d.	- 300	7	7	10	—
		Deficiency	- 10				
			1200		34	17	1
		Contra	Cr.				
1774	Mar. 12	By Clover-feed, for 6 bags, per J.	- 6	6	28	12	—
		Contra	Cr.				
1774	Apr. 2	By Cash	- -	1 1	3	3	—
	14	By George Gordon	- -	1 7	3	5	—
				2	6	8	—
		Contra	Cr.				
1774	Apr. 30	By Balance-accompt	- -	7	4	7	6
		Contra	Cr.				
1774	Apr. 25	By Cash, for share prof. of a voyage to Rot.	- -	1	33	—	—
	30	By Balance-accompt	- -	7	140	—	—
					173	—	—

<i>Dr.</i>		<i>William Ainslie, merchant Alloa,</i>	<i>£</i>			
1774						
Apr.	5	To Sundries, per J.		33	—	—
	8	To Baillie and Bell, for bal. paid him by them	5	117	—	—
				150	—	—
<i>Dr.</i>		<i>Train-oil,</i>				
1774			<i>Casks.</i>			
Apr.	5	To Cash, at 22s.	30	1	33	—
	30	To Profit and Loss, for gain		1	8	—
			30		41	—
<i>Dr.</i>		<i>George Gordon, merchant Stirling,</i>				
1774						
Apr.	14	To Sundries, per J.		41	3	4
				41	3	4
<i>Dr.</i>		<i>Proper Expences,</i>				
1774						
Apr.	18	To Calicoes, for 5 yards, at 3s. 2d.	4	—	15	10
	30	To Cash, for expences since 1st January	1	32	—	—
				32	15	10
<i>Dr.</i>		<i>Thomas Sharp, my clerk,</i>				
1774						
Apr.	30	To Balance-accompt	7	8	—	—
<i>Dr.</i>		<i>Balance-accompt,</i>				
1774						
Apr.	30	To Sundries, per J.		757	12	3
				757	12	3

LEDGER A.

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		Contra	Cr.	Fo.			
1774	Mar. 25	By Share of Ship Hazard, for $\frac{1}{2}$ bt. from him		6	150	—	—
					150	—	—
		Contra	Cr.				
1774	Apr. 11	By James Boswell, at 27s.	-	20	3	27	—
	14	By George Gordon, at 28s.	-	10	7	14	—
				30		41	—
		Contra	Cr.				
1774	Apr. 14	By Cash in part	-	1	35	—	—
	30	By Balance-accompt	-	7	6	3	4
					41	3	4
		Contra	Cr.				
1774	Apr. 30	By Profit and Loss	-	1	32	15	10
					32	15	10
		Contra	Cr.				
1774	Apr. 30	By Char. Merchandize, due him for wages	-	5	8	—	—
		Contra	Cr.				
1774	Apr. 30	By Sundries, per J.	-	1	229	3	2
		By Stock	-	1	528	9	1
					757	12	3

COMPUTATIONS.

		Dr.	Cr.			Dr.	Cr.
Cash	-	L. 599 15 11	L. 591 12 1	4 Salt		L. 17 15 10	L. 17 4 6
		<u>591 12 1</u>				<u>17 4 6</u>	
		L. 8 3 10				Loss L. — 11 4	
2 Meal	-	L. 277 14 8	L. 203 18 8	5 Iron		L. 53 6 8	L. 49 1 3
Dr. 420 bolls.		<u>83 14 —</u>	<u>83 14 —</u>	320 ft.		<u>6 13 4</u>	<u>6 13 4</u>
Cr. 299		L. 83 14 —	L. 287 12 8	280		L. 6 13 4	L. 55 14 7
			<u>277 14 8</u>	40			<u>53 6 8</u>
121						Profit	L. 2 7 11
124				Will. Bruce		L. 50 — —	L. 70 — —
		Profit	L. 9 18 —				<u>50 — —</u>
3 outcome							<u>L. 20 — —</u>
Port-wine		L. 104 10 —	L. 111 5 —	J. Henderson		L. 7 4 —	
		<u>104 10 —</u>	<u>104 10 —</u>	W. Hunter		L. 18 13 6	
		Profit	L. 6 15 —	Char. Merchan.		L. 13 14 2	Loss.
Paper	-	L. 36 15 —	L. 41 13 6				
		<u>36 15 —</u>	<u>36 15 —</u>	6 Ja. Dalton		L. 35 15 —	
		Profit	L. 4 18 6	Clover-feed		L. 29 17 —	L. 27 7 1
Yarn	-	L. 94 17 4	L. 49 12 6	1200 lb.		<u>7 10 —</u>	
Spindles.			<u>47 8 —</u>	890		L. 7 10 —	
834½ 120		L. 47 8 0					L. 34 17 1
360 120			L. 97 — 6	310			<u>29 17 —</u>
			<u>94 17 4</u>	300		Profit	L. 5 — 1
474½				10 deficiency			
Amisling ½		Profit	L. 2 3 2	Linseed		L. 5 10 —	L. 6 8 —
House in Edin.		L. 300 — —				<u>5 10 —</u>	
						Profit	L. — 18 —
3 Ja. Boswell		L. 147 11 —	L. 110 — —	J. Scott		L. 4 7 6	
		<u>110 — —</u>	<u>110 — —</u>	Share Hazard		L. 150 — —	L. 33 — —
						<u>140 — —</u>	
		L. 37 11 —					L. 173 — —
Henry Hardie		L. 31 2 6					<u>150 — —</u>
David Miller		L. 18 — —				Profit	L. 23 — —
Royal Bank		L. 240 — —	L. 441 3 2				
		<u>240 — —</u>	<u>240 — —</u>				
			L. 201 3 2	7 Train-oil		L. 33 — —	L. 41 — —
						<u>33 — —</u>	
4 Calicoes		L. 16 12 6	L. 18 5 10			Profit	L. 8 — —
		<u>16 12 6</u>	<u>16 12 6</u>	Geo. Gordon		L. 41 3 4	L. 35 — —
		Profit	L. 1 13 4			<u>35 — —</u>	
J. Cuthbert		L. 35 6 3				L. 6 3 4	
		<u>30 — —</u>		Proper Ex.		L. 32 15 10	Loss.
				Tho. Sharp.		<u>8 — —</u>	
		L. 5 6 3					
Diaper		L. 7 — —	L. 7 15 10	STOCK		L. 312 7 3	L. 824 2 8
		<u>7 — —</u>	<u>7 — —</u>	Balance		<u>528 9 1</u>	<u>prof. 16 13 8</u>
		Profit	L. — 15 10			L. 840 16 4	L. 840 16 4

PROFIT AND LOSS SHEET.

Salt - -	L. — 11 4	Meal - -	L. 9 18 —
Charges Merchandize	13 14 2	Port wine - -	6 15 —
Proper Expences	32 15 10	Paper - -	4 18 6
		Yarn - -	2 3 2
	L. 47 1 4	Calicoes - -	1 13 4
In ledger -	4 4 10	Diaper - -	15 10
		Iron - -	2 7 11
	L. 51 6 2	Clover-feed - -	5 — 1
Nett gain -	16 13 8	Linfeed - -	— 18 —
		Share of Ship Hazard	23 — —
	L. 67 19 10	Train-oil - -	8 — —
			L. 65 9 10
		In Ledger	2 10 —
			L. 67 19 10

BALANCE SHEET.

Cash - -	L. 8 3 10	Meal, outcome 3 B.	
Meal, 124 b. at 13s. 6d.	83 14 —	Royal Bank	L. 201 3 2
Yarn, 474 sp. at 2s.	47 8 —	Willam Bruce	20 — —
Amiffing $\frac{1}{2}$		Tho. Sharp	8 — —
House in Edin ^r -	300 — —		
Ja. Boswell -	37 11 —		L. 229 3 2
H. Hardie - -	31 2 6		
D. Miller - -	18 — —		
J. Cuthbert -	5 6 3		
Iron, 40 ft. at 3s. 4d.	6 13 4		
J. Henderfon -	7 4 —		
W. Hunter - -	18 13 6		
Ja. Dalton - -	35 15 —		
Clover-feed, 300 lb. at 6d.	7 10 —		
Deficiency 10 lb.			
J. Scott - -	4 7 6		
Share of Ship Hazard	140 — —		
Geo. Gordon -	6 3 4	STOCK -	528 9 1
	L. 757 12 3		L. 757 12 3

CHAPTER II.

PARTICULAR RULES.

§ 55. **T**HE former Chapter contains the general principles of Italian Book-keeping, and is sufficient to unfold the nature and design of that art to the speculative inquirer, to direct the accomptant in common and easy cases, and prepare him for understanding those that are more complicated. The present chapter is intended to remove every remaining difficulty, to point out the further improvements which the art admits of, and direct the accomptant to the most approved methods, in the varieties of extensive and complicated business.

I. BILL TRANSACTIONS.

§ 56. We mentioned, Part III. § 9. that when goods were sold on credit, or money lent, it was a common practice for the deliverer or lender to take his debtor's bill for the value. When transactions of this kind are frequent, it would be tedious to open an account for each particular debtor; and instead of doing so, we may consider the bills received as a kind of real property; and open a general account for them, under the title of *Bills Receivable*. All bills granted to us are entered on the Dr. side of that account, when received; and on the Cr. when delivered. The balance shows the amount of bills on hand.

If we sell 30 quarters wheat to Thomas Penant, and take his bill for the value, at three months date, the Journal post may either be,

Thomas Penant	Dr. to Wheat,	fold him	30 qrs.	at 43s.	per bill	
3 mdt.	-	-	-	-	-	L.64 10 —

Or, Bills receivable Dr. to Wheat, fold Thomas Penant 30 qrs. at
43s. per bill 3 mdt. - - - L. 64 10 —

If articles of this kind be frequent, the second form is best, as it requires no account in the ledger for Thomas Penant, or any other purchaser, but exhibits all the debts in the account of bills receivable.

The narrations in that account should contain the name of the debtor, and term of payment; the article sold may be referred for, if necessary, to the journal.

Accompts may be opened, in like manner, for bonds, promissory notes, debentures, and other writings, received in security for debts, or a general one, under the title of *Obligations receivable*; and a general accompt may be opened for small debts not constituted by writing, under the title of *Petty debts receivable*.

§ 75. When we receive payment of a bill, we must recollect, or inspect the books for the entry when the bill was received, and enter the payment in conformity thereto. Thus, if the entry at selling the wheat was, *Thomas Penant Dr. to Wheat*, the entry at payment must be, *Cash Dr. to Thomas Penant*; but if the sale was entered, *Bills receivable Dr. to Wheat*, the payment must be entered, *Cash Dr. to bills receivable*.

§ 58. The accompt of *Bills payable* is kept to save the trouble of opening an accompt for every person from whom we purchase goods, or borrow money on bills. It contains on the Cr. all the bills we grant, and on the Dr. all the payments we make for the same. The balance shows what bills we still owe.

Thus, if we buy 13d hds. claret from Wilson and Campbell, at L. 36 per hd. and grant our bill at 6 months date, the journal entry may be,

Claret Dr. to bills payable, bought from Wilson and Campbell
13 hds. at L. 36, per bill 6 mdt. - - - L. 468

In which case the entry at payment must be,

Bills payable Dr. to Cash, paid bill to Wilson and Campbell
6 mdt. - - - - - L. 468

§ 59. When our correspondent, A. B. draws bills on us, or remits us bills to receive payment of, the entries may be made, according to either of the following methods:

Method 1st, We may enter the bills drawn on us, when we accept them, in a register or bill-book kept for that purpose, but make no entry in the waste-book or journal at that time. Then when we pay them, the journal entry is, *A. B. Dr. to Cash*.

Also we may enter bills remitted us in a bill-book, and when we receive payment, the journal-entry is, *Cash Dr. to A. B.*

This method shows what money we advance for A. B. or what money of his we have in our hands, and introduces the articles at the proper dates for computing interest, but does not exhibit the amount of our engagements or securities.

§ 60. *Method 2d*. When we accept the bills, we may enter *A. B. Dr. to Bills payable*; and then when we pay them, the entry is, *Bills payable Dr. to Cash*. Also when we receive bills, we may enter, *Bills receivable Dr. to A. B.*; and when these bills are paid, the entry is, *Cash Dr. to bills receivable*.

By this method the bills drawn on us are brought to the Dr. of A. B.'s accompt, as soon as they are accepted, and the bills received from him are brought to his Cr. as soon as they come into our hands: Therefore the balance of his accompt exhibits the extent of our engagements, deducting the securities in our hands.

As it is necessary in business to know the extent both of our engagements and actual advance, both methods have their use. We

may keep the accompt after either form we please in the principal books, and open a subsidiary book for the other form.

§ 61. When we draw a bill on any person payable to another, Cash, or the thing received for it, or the person to whom it is delivered in trust, is Dr. to the person on whom it is drawn.

§ 62. When one person draws a bill on another, on our accompt, the drawer is Dr. to the person on whom he draws.

§ 63. If we purchase bills on a foreign place to sell again, we may consider them as a kind of real property, and raise accompts in the ledger for them, intituled, *Bills on Holland, Bills on France*, or in general, *Bills of Exchange*. Bills bought are entered on the Dr. bills sold on the Cr. of this accompt. The balance shows the bills on hand, and the gain or loss.

§ 64. When we indorse a bill received from A. B. that was not entered in the principal books when received, we enter *Cash*, (if for ready money,) or *The indorsee* (if on credit,) *Dr. to A. B.* But if the bill was entered when received, the entry when indorsed is *Cash*, or *The indorsee Dr. to Bills receivable*, or to *Bills of Exchange*.

§ 65. When we return a bill to the person from whom we received it, it is not necessary to enter it when returned, unless it was entered when received. In that case the entry is *A. B. Dr. to Bills receivable*.

§ 66. If a bill that we had indorsed be returned on us for non-payment, we must charge Drawer, or the person from whom we got it, *Dr. to the person who returned it*. The accomptant will readily perceive what entries are necessary, if we pay ready money to the person who returns it, or receive ready money from the person accountable for it.

II. FOREIGN TRADE.

§ 67. Goods may be sent to a foreign country either in the way of sale or consignment.

When goods are purchased by a foreign merchant, and sent abroad at his risk, the transaction is of the same kind as a sale in domestic trade, and is entered exactly in the same manner.

When goods are sent abroad at the risk of the proprietor, and consigned to a factor, to be sold in trust for him, it is necessary to open several accompts, which do not occur in domestic trade. Our books should exhibit every kind of property which belongs to us, and point out the place where, and circumstances under which, we possess it. Therefore the goods which we have at sea, whether outward or homeward bound; the goods in our factor's hands; the debts due to our factor for goods sold on credit; and the balances due to us by our factor, must be entered under titles which distinguish the situation of our property.

§ 68. For these purposes the following accompts are kept :

1st, *Voyage or Adventure to B.* which contains on the Dr. the value of the goods sent to sea, with charges, and on the Cr. the value of the cargo when it arrives at the place of destination, or when the adventure otherwise comes to an issue. The balances of these accompts show what property we have at sea in voyages outward.

2d, *W. L.* (the factor,) *my accompt of goods*, which contains on the Dr. the value of the goods in the factor's hand, and on the Cr. the disposal of the same. The balance shows what goods remain in his hands; and when the sales are finished, it shows the gain or loss.

3d, *W. L.* *My accompt of debts*, or *My accompt on time*, which contains, on the Dr. the debts owing for goods sold by our factor, in trust for us, and, on the Cr. the payments received by him for the same. The balance shows the extent of outstanding debts.

4th, *W. L.* *My accompt-current*, is a personal accompt between our factor and us.

5th, *Voyage or Adventure from B.* which contains the value of goods shipped for us on the Dr. and their value, when they come to hand, or are otherwise disposed, on the Cr. The balance shows what property we have at sea in voyages homeward.

§ 69. In order to journalize an article in foreign trade, we must attend to the kind of property acquired, and of the debt contracted, or property given in exchange for it; consider what ledger accompts they fall under; and charge the former accompt Dr. to the latter. The method of this will be clear from the following examples :

WASTE-BOOK. 1st, Shipped a cargo wheat, per the *Eolus*, Lawson, for Bourdeaux, consigned to William Lamotte merchant there.

2d, Received advice from W. Lamotte, that the cargo is come safe to hand.

3d, William Lamotte advises that my wheat is sold on credit.

4th, William Lamotte has received payment of my wheat.

5th, William Lamotte has shipped, in return, a cargo claret, per the *Mary*, Smith.

6th, Received the wine, per the *Mary*, Smith, from Bourdeaux.

JOURNAL. 1st, *Adventure to Bourdeaux, per the Eolus, Lawson, Dr. to wheat*, if formerly on hand, or, *To cash*, if presently bought for ready money, or, *To the seller*, if bought on credit.

2d, *William Lamotte, My accompt of wheat Dr. to adventure to Bourdeaux*, for value of the cargo received by him.

3d, *William Lamotte, My accompt of debts Dr. to ditto my accompt of wheat*, for the cargo per the *Eolus*, sold by him on credit.

4th, *William Lamotte, my accompt-current Dr. to ditto my accompt of debts*, for payment of the wheat received by him.

5th, *Adventure from Bourdeaux, per the Mary, Smith, Dr. to W. Lamotte, my accompt-current*, for a cargo claret shipped by him.

6th, *Claret Dr. to Adventure from Bourdeaux*, for the cargo per the Mary, Smith, arrived and unloaded.

§ 70. During the course of these transactions, our property undergoes a variety of alterations. The wheat in our hand is changed for an adventure at sea; for goods in our factor's hands; for debts due to our factor in trust for us; for a debt due to us by our factor himself; for a cargo claret at sea; and, lastly, for claret in our own possession. In this specimen, we have carried it through all the accompts in which it can possibly be introduced; but frequently there are fewer entries necessary; because the first or following advices may comprehend several particulars. For example, if the first notice we receive be, that our factor has received the goods and sold them for ready money, the journal-entry is, *W. L. my accompt-current Dr. to adventure to B.*; and there is no occasion for opening *W. L. my accompt of goods*, or *W. L. my accompt of debts*; because we had no advice of the property being under the circumstances which these accompts point out. Again, if the goods shipped homeward come to hand as soon as the invoice, the entry is, *Claret Dr. to W. L. my accompt-current*, and there is no accompt opened for *Adventure from B.*

In like manner, in order to save trouble, merchants do not always enter the first advices in their books, but sometimes wait the issue of the adventure: And, for the same reason, goods sent to sea are sometimes considered as deposited in the factor's hands, so soon as they are shipped, and charged immediately to the Dr. of *W. L. my accompt of goods*. This answers well enough where further advices are soon expected, or where the voyages are short, so that the goods will probably come soon to hand; but, if our property be likely to continue long in the same situation, it ought to be entered on the Dr. of an accompt that points out that particular situation.

§ 71. It is proper here to lead the learner's attention to the reference which one journal-entry has to another. There are some articles which may be journalized in different ways, with equal propriety: But when a second article relating to the same subject occurs, there is no room for choice; it must be journalized in strict conformity to the former. An instance of this occurred § 57; and the entries in foreign trade illustrate it more fully. The following rules must be well understood, and carefully remembered.

1st, *When any kind of property is entered on the Dr. of a ledger-accompt, it must be entered on the Cr. of the same accompt, when it is disposed of, or altered.*

2d, *When any debt contracted is entered on the Cr. of a ledger-accompt, it must be entered on the Dr. of the same accompt when paid or compensated.*

3d, *When one article is exactly opposite to a former one, (as in the case of returning goods bought), it must be journalized, by reversing*

sing the former entry, i. e. by making that accompt Dr. which was Cr. before, and that accompt Cr. which was Dr. before.

§ 72. To return to our subject : When an article passes through all the accompts in the foregoing specimen, it is best to close the accompts of the adventures, out and home, to a point, by making them Cr. for the same sum which was placed on their Dr. ; and then the gain or loss on the outward voyage appears from the balance of *W. L. my accompt of goods*, and that of the homeward voyage from the accompt of goods imported. But if there be no accompt opened for *W. L. My accompt of goods*, or *Goods imported*, then the balances of the adventures will point out the gain or loss.

§ 73. If the learner understand the simple journal-posts that occur in foreign trade, he will find little difficulty in the complex ones. The following are the most common cases.

1st, When the cargo is partly furnished by ourselves, partly purchased, we enter thus :

Adventure to B. Dr. to Sundries.

To Goods furnished by ourselves.

To Seller, or *Bills payable*, for goods bought on credit.

To Cash, for goods bought for ready money, and for charges.

2d, When the factor advises that the goods are received and partly sold,

Sundries Dr. to voyage to B.

W. L. My accompt-current, for ready money sales.

Ditto, My accompt of debts, for sales on credit.

Ditto, My accompt of goods, for goods in his hands.

3d, When the cargo homeward arrives, and charges are paid or incurred,

Goods received Dr. to Sundries.

To voyage from B. for prime cost.

To Cash, for charges paid.

To J. T. for charges incurred not paid.

III. FACTORAGE.

§ 74. A factor is a person employed to sell goods, or transact any business for another. His books ought to exhibit a distinct state of affairs under his charge ; and, for this purpose, his ledger must contain the following accompts, besides the usual ones respecting his proper business.

1st, *A. H.* (the employer) *his accompt of goods*, which contains the charges paid out on the Dr. and the goods sold on the Cr. It may be ruled with inner columns, in which the quantities received are entered on the Dr. and the quantities sold on the Cr. in order to show what remains on hand.

2d, *A. H. His accompt of debts*, which contains the debts due for our employers goods on the Cr. and the payments of the same on the Dr.

3d, *A. H. His accmpt-current*, which is a personal accmpt between the factor and his employer.

These accmpts are counterparts to those kept by the employer, explained § 68. and the Dr. of the one corresponds to the Cr. of the other.

§ 75. The following are the journal-entries for the ordinary occurrences in a factor's business :

1st, When he receives goods, and pays charges,

A. H. His accmpt of goods Dr. to Cash. Paid charges on, &c.

2d, When he sells goods,

Buyer, or Cash, Dr. to A. H. his accmpt of goods.

If he take any of the goods to himself,

Goods Dr. to A. B. my accmpt of goods.

3d, When he charges his own commission, or incidental charges, in order to prepare for a settlement,

A. H. His accmpt of goods Dr. to Sundries.

To Commission-accmpt, for commission.

To Charges Merchandize, for incidental expences during sale.

4th, When he sends accmpts sales,

A. H. His accmpt goods Dr. to ditto his accmpt-current, for nett proceeds, if the money be all paid,

Or, *To ditto, his accmpt of debts*, if it be all owing,

Or, *To Sundries.*

To ditto his accmpt-current, for part received.

To ditto his accmpt of debts, for part owing.

5th, When a debt due for his employers goods is paid, after the above-mentioned entries have been made, the transaction produces a twofold alteration on the state of the factor's affairs, as it has respect both to his debtor and his employer, and therefore requires to be twice entered in the journal. First, *Cash Dr. to buyer*, for the sum received. Secondly, *A. H. His accmpt of debts Dr. to ditto his accmpt-current*, for the buyer's debt recovered. The reason of the second entry is, that the amount of his debts due for the employer's goods is diminished, and the amount owing by the factor to the employer increased by the transaction.

6th, When goods are shipped for his employer,

A. H. His accmpt-current Dr. to Sundries.

To Cash, for goods bought for ready money and charges.

To Goods, if formerly belonging to the factor.

To Seller, or Bills payable, if bought on credit.

To Commission-accmpts, for his commission.

§ 76. When a factor takes the risk of the debts on himself, and charges an allowance for doing so, it is necessary to open an accmpt for insurance of debts. The allowance is placed to the Cr. of this accmpt, and may be charged in the same complex post with the commission and other charges. If any losses occur by bad debts, they are entered on the Dr.; and, when all debts are recovered, or de-

despaired of, this accompt is balanced by Profit and Loss. In this case, there is no accompt opened for A. H. his accompt of debts, but the full balance of the accompt of goods, whether paid or outstanding, is transferred to the accompt-current, when the sales are completed; and there are no second entries when the payments are received.

IV. INNER COLUMNS FOR FOREIGN MONEY.

§ 77. If an accompt with a foreigner is to be settled in British money, we have no occasion to compute the value of the articles in foreign money, and the entries are the same as in domestic trade: But, if the accompt is to be settled in foreign money, we must enter the value of each article, reduced to that money, in an inner column. In these accompts, if we are able to receive the money which is due us, at a more advantageous rate of exchange than we expected when the debt was contracted, or pay the money which we owe, at a cheaper rate, there is a gain obtained; on the contrary, a loss is sustained, if the rates of exchange undergo the opposite alterations. See Part III. § 25.

If the sums of the inner columns be equal, there is nothing due by the one party to the other; and then, if the sums of the outer columns be unequal, the difference is gain or loss. But, if the inner columns be unequal, the balance due from one party to the other must be valued at the current rate of exchange; and, after the value is added to the proper side, the difference of the outer columns is the gain or loss.

§ 78. If we have different transactions with a foreigner, some of which are to be settled in British, and some in foreign money, the articles should be entered in separate accompts. The title for the former is, *A. B. his accompt*, because it generally contains business transacted by us at his desire. The title of the latter is, *A. B. my accompt*, because it generally contains business transacted by him at our desire. The balance of one accompt may be transferred to the other when we settle.

§ 79. When a course of transactions is carried on by bills with a foreigner, the accompts are kept in the same manner. For example, suppose we draw *f.* 10,000 on Holland, and afterwards remit the same number of guilders; then, if we buy the bills remitted cheaper than we sell our draughts, it is obvious the inner column of the Dutch merchant's accompt will balance, but the Cr. of the outer column, where the value of the draught is entered, will be greater than the Dr. where the value of the remittance is entered, and the difference is our gain: On the contrary, if we be obliged to remit at a higher rate, the Dr. of the outer column is greater, and the difference is loss. If we have only remitted *f.* 6000, we must compute

pute what the remaining *f.* 4000, which we have still to remit, will come at the present rate of exchange, before our gain or loss can be ascertained.

§ 80. When an accompt of this kind is carried on, at the risk, and with a view to the benefit of one party, the other is intitled to an allowance for commission; and the best way of entering this in the employer's books is, by placing the commission, which is always charged in foreign money, in the inner column, without extending the value to the outer. Thus, if we allow our correspondent in Holland *f.* 50, as commission, for answering our bills, we become equally indebted to him as if we had drawn another bill on him for that sum; and the business is attended with the same burthen as if we had been obliged to give away that bill for nothing. Had that been done, the bill must have been entered on the Cr. in the inner column, but no value extended to the outer. This method of entry is better than charging *Profit and Loss*, or *Commission-accompt Dr. to our correspondent A. B.*; for, if that method were used, an imaginary gain would appear on balancing our correspondent's accompt, which would be counterbalanced by a latent loss in a different accompt.

Accompts between London and other places in Britain, where bills bear a premium, or pass at a discount, are kept in the same manner. See Part III. § 49.

V. EXCHANGE ACCOMPTS.

§ 81. When a merchant conducts the bill-business, after the manner above explained, he is frequently restricted in his proceedings; as he cannot take advantage of every favourable alteration in the rate of exchange, to extend his transactions, unless he be sure that the gain will do more than answer for his correspondent's commission. In order that this kind of business may be conducted with greater freedom and security, the practice of exchange accompts has been invented, in which both parties are equally interested, and neither charges the other with commission, but the gain or loss is divided between them. As the conducting and balancing these accompts is attended with some difficulty, we shall explain it at length.

§ 82. Let us suppose, that John Bull of London draws bills on J. Van Kempen of Amsterdam, and remits him others, charging the remittances when sent, and giving credit for his own bills when drawn; and let the following be a specimen of their transactions, as drawn out from John Bull's books.

Mr J. Van Kempen Amsterdam, his Exchange Acc. with John Bull.

1774.

Jan. 28.	To remittance	2 ufa.	f. 1000	L. 90
Feb. 17.	To ditto	30 dd.	750	68
Mar. 10.	To ditto	ufa.	840	75
Apr. 9.	To ditto	2 ufa.	500	45
12.	To ditto	2½ ufa.	320	28
May 5.	To ditto	20 dd.	640	57
10.	To ditto	2 ufa.	1000	90

1774. *Contra Cr*.*

Jan. 15.	By draught	2 ufa.	f. 1200	L. 113
Feb. 17.	By ditto	15 dd.	1400	133
Mar. 3.	By ditto	2 ufa.	1600	150
Apr. 1.	By ditto	20 dd.	700	65
May 1.	By ditto	ufa.	800	75
June 3.	By ditto	ufa.	200	19

These bills will be entered by J. Van Kempen on the days he pays and receives them; which, allowing 6 days of grace, will stand as follows :

Dr. J. Bull, his Exchange-accompt with J. Van Kempen.

1774.

Mar. 10.	To his draught	17 Feb.	15 ddt.	L. 133	f. 1400
21.	To ditto	15 Jan	2 ufa.	113	1200
Apr. 27.	To ditto	1 cur.	20 ddt.	65	700
May 9.	To ditto	3 Mar.	2 ufa.	150	1600
June 7.	To ditto	1 May	ufa.	75	800

1774. *Contra Cr.*

Mar. 25.	By remittance	17 Feb.	30 ddt.	L. 68	f. 750
Apr. 3.	By ditto	28 Jan.	2 ufa.	90	1000
16.	By ditto	10 Mar.	ufa.	75	840
May 31.	By ditto	5 cur.	20 ddt.	57	640
June 15.	By ditto	9 Apr.	2 ufa.	45	500

§ 83. In order to settle this accompt, we must first take notice, that there may be several bills entered in the books of one party, which are not yet introduced into those of the other; because they are entered by the party who resides in London, when drawn or remitted; and, by the other party, not till they be paid in Holland. In the above specimen, let the accompt be required to be settled 30th June; then the fifth and seventh articles on the Dr. and the sixth on the Cr. of John Bull's books, which do not fall due till after that date, will not be entered at all in Van Kempen's books.

The books must be brought to agree in this particular; and, as

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* The Cr. side of the accompt is here placed under the Dr. for the convenience of printing. In business, the Dr. is written on the left-hand side of the paper, and the Cr. against it on the right-hand side.

the settlement must be regulated by the books which are farthest back, John Bull must replace the articles still depending, in the manner explained § 45.; and then his books agree with Van Kempen's, the Dr. of the one to the Cr. of the other, and the outer columns of the one to the inner ones of the other.

If bills had been drawn and remitted from Holland, as well as from London, there might have been occasion to replace articles in Van Kempen's books, as well as in Bull's.

§ 84. Secondly, Exchange-accounts are generally combined with a calculation of interest; as business of this kind cannot be conducted without an advance of money by some of the parties, for which allowance must be made; but here we must notice, that sometimes all the money advanced by one party is not in the hands of the other, and sometimes there is more. For example, if we draw bills at short date, and, soon after, remit bills at long date, our correspondent will remain in advance longer than we have the money in our hands. If we draw at long date, and remit at short date, the opposite will happen. And both parties may be in advance, if one of them remit bills at long date, and, soon after, draws others at short date, which must be paid before the remittances fall due. And both parties may have money in hand by a contrary management.

Equity points out in what manner the interest should be adjusted. The party who advances money should be allowed full interest; and, if the opposite party has not had as much in hand, he ought only to be charged with the interest of what has been in his possession; and the rest of the interest should be paid out of the profits of the account. Also, the party into whose hands money has been put, should be charged with the full interest of it; and, if the other party be not intitled to receive it all, the remainder goes towards the profits of the account.

For this purpose we compute the interest on the account as it stands in the books of both parties, and enter *Interest account Dr. to J. V. K.*; or, *J. V. K. to Interest-account*; placing the sum calculated from his books in the inner column, and that calculated from our own books in the outer. The rates of interest depend on the customs of the country, or agreement betwixt the parties. If interest were due to both parties, or by both, it would be entered on opposite sides, viz. on the Dr. of the outer, and Cr. of the inner column, if due to both; and, on the Cr. of the outer, and Dr. of the inner, if due by both.

§ 85. Thirdly, there are generally postages, and other small charges, paid out by both parties, during the course of the transactions, which must be brought into the books before a settlement. This is done, by making *J. V. K.* outer column, *Dr. to Charges Merchandize*, for our disbursements; and giving him credit in the inner column for his. The learner must advert, when an article is entered

tered in the inner column only, it is not a regular ledger entry, and requires no opposite article in another accompt.

§ 86. Fourthly, These things being prepared, add the inner columns on a separate paper, and find the balance. This is what would be due to or by the other party, were it not that his share of gain or loss is to be added or subtracted. Calculate the value of the balance at the current rate of exchange; then add the outer columns, and add the value of the balance to the proper side. If the outer columns then be equal (which will rarely happen), there is neither gain nor loss; if not, the difference is gain or loss, according as the Cr. or Dr. preponderates.

§ 87. Fifthly, To divide this difference, reduce the half of it to foreign money, at the current rate of exchange; and if there be gain, credit J. V. K's inner column for the same. Then make *J. V. K's outer column Dr. to Profit and Loss*, for your own half, in Sterling money. If there be loss, make the opposite entries. After which, the inner columns will balance, by the precise sum due to your correspondent; and the outer columns, by the exact value of the same, in Sterling money.

§ 88. J. Van Kempen's accompt with John Bull, when balanced in Bull's books, according to these directions, will stand thus:

Dr. Mr. J. Van Kempen, Amsterdam, his Exchange-accompt with John Bull, London.

1774.			
Jan. 28.	To cash for remittance 2 ufa.	f. 1000 — —	L. 90 — —
Feb. 17.	To ditto 30 dd.	750 — —	68 — —
Mar. 10.	To ditto ufa	840 — —	75 — —
Apr. 9.	To ditto 2 ufa.	500 — —	45 — —
12.	To ditto 2½ ufa.	320 — —	28 — —
May 5.	To ditto 20 dd.	640 — —	57 — —
10.	To ditto 2 ufa.	1000 — —	90 — —
June 30.	To article 3d June replaced	200 — —	19 — —
	To postages paid by Bull	— — —	9 7
	To John Bull's half share profits	— — —	6 14 9
	To balance, Ex. 35s.	2060 15 —	196 5 3
		f. 7310 15 —	L. 675 9 7

1774.	<i>Contra Cr.</i>			
Jan. 15.	By cash for draught 2 ufa.	f. 1200	— —	L. 113 — —
Feb. 17.	By ditto 15 dd.	— 1400	— —	133 — —
Mar. 3.	By ditto 2 ufa	— 1600	— —	150 — —
Apr. 1.	By ditto 20 dd.	— 700	— —	65 — —
May 1.	By ditto ufa.	— 800	— —	75 — —
June 3.	By ditto do.	— 200	— —	19 — —
30.	By articles 12th April and 10th May, replaced	1320	— —	118 — —
	By interest on the above accompt	11 18	— —	2 9 7
	By postages paid by J. V. K.	8 2	— —	— — —
	By J. Van Kempen's half profits	70 15	— —	— — —
		f. 7310 15	—	L. 675 9 7

Here we first replaced the two remittances which were not due at the time of settlement, on the Cr. and the draught which was not due, on the Dr. This brings the balance in both columns of John Bull's books to a conformity with those of Van Kempen. Then we calculate the interest due by Bull, according to the dates in his books, and Sterling sums; and that due to Van Kempen, by the dates in his, and sums of Dutch money. The rates in this specimen are supposed $4\frac{1}{2}$ per cent. in London, and $2\frac{1}{2}$ in Amsterdam. Next, we place the postages paid out by Bull on the Dr. of the outer column, and those paid by Van Kempen on the Cr. of the inner column.

These things being prepared, we add both columns, and find the balance of the inner f. 1990, and that of the outer L. 203. So Bull owes Van Kempen f. 1990; and, if it would require L. 203 in Sterling money to purchase a bill for that number of guilders, the accompt might be finished, without either gain or loss, by remitting it. But if Bull can remit the balance on easier terms, there is a gain obtained on the transactions; and as Van Kempen is intitled to the half of the gain, it increases the balance due to him. If the rate of exchange be 35s. the balance may be remitted for L. 189 : 10 : 6; and consequently the gain is L. 13 : 9 : 6. Of which Bull's half is L. 6 : 14 : 9; and Van Kempen's, reduced to Dutch money, is f. 70 : 15; the former is placed on the Dr. and the latter on the Cr. in the proper columns. After which, the balance due Van Kempen is f. 2060 : 15, and the value of the same, at 35s. L. 196 : 5 : 3. And both columns of the accompt are brought to balance, by posting these sums on the Dr.

VI. GOODS BOUGHT BEFORE DELIVERY.

§ 89. It is a common practice among merchants, to make contracts or forehand bargains for goods, deliverable against some future time; and sometimes money is advanced upon these bargains. Whether there be any advance or not, as these bargains must be fulfilled,

fulfilled, and have a present influence on the state of affairs, they should be entered when the contracts are made, in order to render the books complete.

For this purpose, the goods contracted for, but not yet received, may be considered as a peculiar kind of property in the custody of the seller, and an accompt may be opened for them, under the title of *Goods receivable*, or the like. This accompt contains all the goods bought on forehand bargains on the Dr. and the goods received, in fulfilment of the same, on the Cr.; and the balance shows what bargains still subsist.

The journal-entries are the following: When you buy goods by forehand bargain, *Goods receivable Dr. to Contractor*, or *Cash*: When the goods are received, *Wine*, or the thing received, *Dr. to Goods receivable*: If the bargain be passed from by mutual consent, *Contractor Dr. to Goods receivable*: If money be returned, *Cash Dr. to Goods receivable*.

§ 90. If you have other dealings with the contractor, it is better to enter the depending bargain to his Cr. on a separate accompt, because there is nothing strictly due to him from that bargain till the goods be delivered; and therefore the value should not appear on his Cr. among other transactions already completed. For this purpose, you may raise an accompt, intitled, *A. B. his delivery-accompt*; and, when you make the bargain, charge *Goods receivable Dr. to A. B. his delivery-accompt*. When you receive the goods, enter them as directed above; and likewise enter *A. B. his delivery-accompt Dr. to ditto his accompt-current*, for the value, if received on trust, or, *To Cash*, if ready money be paid. If you deal with several persons in this way, you may open a general accompt, intitled, *Purchasers on delivery*; which will contain, on the Cr. the debts you owe on these depending bargains, and, on the Dr. the payment or transference of these debts, when the bargains are fulfilled.

§ 91. When you advance money on a forehand bargain, you repose a confidence in the seller, because you depend on his credit for the delivery of the goods. Your books should exhibit the extent of this risk; and this may be done, by charging, *A. B. his accompt-current Dr. to Cash*, for what you advance, and *Goods receivable Dr. to A. B. his delivery-accompt*, for the value of the depending bargain.

§ 92. When you sell goods on forehand bargain, the goods sold, or their value, may be considered as a peculiar kind of debt, due by you to the purchaser; and an accompt may be opened for debts of this kind, under the title of *Goods deliverable*; which will contain the goods you engage to deliver on the Cr. and the goods delivered on the Dr.; and the balance will show what obligations you have still to fulfil. The journal-entries are analogous to those respecting goods receivable.

§ 93. If you send away goods without orders, in expectation of their being kept, you may raise an accout for them, under the title of *Suspense accout*, and charge it Dr. to the goods sent away, till the issue be known.

VII. DESPERATE DEBTS.

§ 94. A merchant should be careful not to overvalue his stock; and therefore, when a debt becomes desperate, it should either be thrown out of the books altogether, or distinguished in such a manner, that it may not mislead him in estimating the amount of his property.

If you choose to throw it out entirely, charge *Profit and Loss Dr. to the Bankrupt*. But if you follow that method, the debt must be entered in a separate book kept for that purpose, as there is always a chance, however small, that it may be recovered, through a change of circumstances. If that happen, enter *Cash Dr. to Profit and Loss*, for the sum received.

§ 95. If you chuse to reserve it in the books, you must open an accout, under the title of *Bad debts*, and charge that accout Dr. to the persons whose debts you despair of recovering. This brings all the bad debts to the same accout; exhibits the amount of them at one view; and saves the trouble of transferring the particular accounts from ledger to ledger: And although it introduces the amount of these debts as an article of your stock at the general balance, no great inconvenience follows; because the title by which they are distinguished must lead you to make the proper estimate. If you follow this method, when a debt, charged as bad, is recovered, you must enter *Cash Dr. to Bad debts*. If any of these debts become likely, through an alteration of circumstances, to be recovered, we may open the debtor's accout anew, by charging him Dr. to Bad debts.

VIII. PARTNERSHIP.

§ 96. When two or more partners are engaged in trade, their books should not only show what property they have, and how they stand with neutral persons, but also how they stand with each other, and what share each possesses in the stock of the company. This branch of our subject requires several divisions.

A. *When the partnership is only occasional, and another partner the manager.*

§ 97. The property which you have in the hands of the manager must be entered, as all other articles of your stock are, on the Dr. of an accout in the ledger kept for that purpose. The title may be *Goods in Co. with A. B.*; *Voyage in Co. with A. B.*; or, *A. B. my accout in Co.*; which last is the most comprehensive; and, if the

the company deal in several branches of trade, includes them all. This accompt contains the value of your share on the Dr. and the returns obtained on the Cr.; the balance shows the present extent of your property in the funds of the company; and, when all your share is withdrawn, it shows your gain or loss.

You will also have occasion to open a personal accompt for the manager, which may be intitled *A. B. my accompt-proper*.

§ 98. The most usual journal-entries are the following:

1st, When you pay in your share to the manager, *A. B. my accompt in Co. Dr. to Cash*, or to the thing given in.

2d, If the manager advances your share, *A. B. my accompt in Co. Dr. to ditto my accompt-proper*. Then, when you pay him, charge, *A. B. my accompt-proper Dr. to Cash*, or to the thing given.

3d, When the manager reckons with you, on the company's goods being disposed of, and pays your share, *Cash*, or the thing received, *Dr. to A. B. my accompt in Co.*

4th, If he only reckons with you, but defers payment, *A. B. my accompt-proper Dr. to ditto my accompt in Co.*; and then, when he pays you, *Cash*, or the thing received, *Dr. to A. B. my accompt-proper*.

5th, If you settle accompts and receive your share of profits, but the capital continues in the manager's hands for further trade, *Cash*, or the thing received, *Dr. to Profit and Loss*. If the manager do not pay your share immediately, *A. B. my accompt-proper Dr. to Profit and Loss*.

6th, If it be agreed to accumulate the profits for increasing the stock in company, *A. B. my accompt in Co. Dr. to Profit and Loss*.

B. Shares of fixed companies under the management of a trustee.

§ 101. The ledger accompts and journal-entries, in this case, are exactly the same as in the former: But if the funds of the company be incumbered with considerable debts, it will be proper to notice them in the inventory of our private affairs. For example, we may be concerned in a manufactory, and the value of our share of the stock may be L. 2000, and our share of the debt on it L. 1500, so that our nett property is only L. 500. In this case, if we entered the L. 500 only in our inventory, our books would not exhibit a proper view of the extent of our concern and risk on the manufactory, but would represent it as more inconsiderable than it really is, in comparison with the other parts of our business. This inconvenience may be removed, by entering the whole L. 2000 in our inventory, and the L. 1500 in the list of debts, under the title of *Manufactory debts*.

C. Occasional Partnership. The accompts kept by the manager in his own books.

§ 102. The books of the manager should contain an exact record
of

of all the purchases, sales, payments, debts, and adventures, in which the company is concerned; and also the share of the common stock which belongs to each partner, and the debts due by them to the manager, or by the manager to them. It requires some trouble to exhibit these particulars with sufficient clearness in the same books that contain his private business. An accurate method has been laid for this purpose, which is seldom used, on account of its prolixity; but which deserves the attention of the learner, because it unfolds the general principles of book-keeping, and may be altered or abridged as the particular circumstances of the business require.

The ledger-accompts are, one for every kind of goods or adventure in which the company is concerned, and two for each partner, except the manager. One of them is intitled, *His accmpt in Co.* and shows his proportion of the company's funds; the other is intitled, *His accmpt proper*, and shows what is owing between him and the manager.

103. We shall lead the learner to the method of conducting these accompts by an easy example. Suppose you agree to trade in company with A. B. and C. D. each one-third concerned; and that you purchase goods for ready money, in consequence thereof, to the value of L. 300, and advance the whole of that sum: As you receive the company's goods in exchange for your own money, you must enter in the journal, *Goods in Co. Dr. to Cash* L. 300.

But this transaction has respect to your partners also. The goods received are not all your own: your partners are the real proprietors of their respective shares, and must be credited for the same in those accompts of your ledger which are intended to show their proportion of the company's effects in your hands. Again, your partners are indebted to you for their proportions of the price of the goods; for each should have paid his own, and not obliged you to advance the whole. On these considerations, it is necessary to make a second entry for regulating your partner's accompts, viz.

A. B. his accmpt-proper Dr. to ditto his Acc. in Co. for his $\frac{1}{3}$ of above - - - - - L. 100

C. D. his accmpt-proper Dr. to ditto his Acc. in Co. for ditto, 100

If you afterwards sell these goods for ready money, and receive L. 330, you must first enter, *Cash Dr. to Goods in Co.* L. 330; and then because the effects which belonged to your partners, and which were on the Cr. of their accompts in Co. in your hands, are now disposed of, you must make their accompts in Co. Dr.; and because you become indebted to them for their share of the money received, you must make their personal accompts Cr.; the second entry will therefore be,

A. B. his accmpt in Co. Dr. to ditto his Accmpt proper, for his $\frac{1}{3}$ of above - - - - - L. 110

C. D. his accmpt in Co. Dr. to ditto, his Acc. proper, for ditto 110

These entries being made, and the affairs of the company concluded, the balance of the accompt of goods, which is L. 30, shows the profits, and must be divided among the partners by the following entry:

Goods in Co. Dr. to Sundries.

<i>To A. B. his accompt in Co. for his $\frac{1}{3}$ gain</i>	L. 10
<i>To C. D. his accompt in Co. for ditto</i>	- - 10
<i>To Profit and Loss for my own third</i>	- - 10
	— L. 30

As the partners accompts in company contain the value of their shares of the goods as purchased on the Dr. and the value of the same as sold, on the Cr. together with the gain or loss, on the proper side, it is evident these accompts must balance when the goods are all sold, and the gain or loss charged.

If the goods be sold on credit, the second entry for regulating the accompts of the partners may be made when the goods are sold, or it may be deferred till payment.

If you make the second entry at the time of the sale, the partners shares of the company's effects which were entered on the Cr. of their accompts in company, when purchased, are brought to the Dr. of the same accompts when sold; and the balances show their shares of the goods still in the manager's hands: But the value of the sales is brought to the Cr. of the proper accompt of the partners, so soon as the goods are sold, though the manager be not accountable for it till he receive payment; and therefore, it cannot be known, by inspection, how much is owing between the partners and manager.

If you defer the second entry till payment, the balances of the accompts in company show what property the partners have in the funds of the company, comprehending both the goods on hand, and the debts due to them; and the balances of the accompts-proper show at once how matters stand between the partners and manager. The first method is generally shorter; but the second seems, in other respects, preferable.

§ 104. Having illustrated, in a simple instance, the principles upon which the journal-entries depend, we shall specify some particular cases.

1st, When the goods, or other property, is brought into company, if each partner finds his exact proportion, or pays his share of those purchased, enter *Goods in Co. Dr. to Sundries.*

To Cash, goods proper, or Seller, for your own share.

To each partner, his accompt in Co. for his share. And there is no second entry.

2d, When the partners do not pay in proportion, or some of them not at all, enter twice.

Goods in Co. Dr. to Sundries.

To Cash, or goods proper, for what you pay in.

To each partner his accompt-proper for what he pays or gives in.

To Seller for goods bought on credit. And,

Each partner, his accompt-proper, Dr. to ditto his accompt in Co. for his share of what is purchased.

3d, When more goods are bought, or charges paid out on those formerly bought, or the company's stock in any way extended, enter the transaction as in proper trade, and also charge *each partner his accompt-proper Dr. to ditto his accompt in Co.* for his share of such extension.

4th, When the goods are sold in whole, or in part, or the company's stock otherwise circumscribed, enter the transaction; and if you design to follow the first method explained in the former paragraph, charge *Each partner his accompt in Co. Dr. to ditto his accompt-proper* for his share of what is disposed on; but if you follow the second method, that entry is deferred till payment.

5th, Foreign voyages, consignments, barbers, payments among the partners, and all other articles, are entered as in proper trade. If the funds of the company be not altered by the transaction, there is no second entry. If they be extended, charge the *Accompts-proper of the partners Dr. to their Accompts in Co.* for their shares of the augmentation. If they be contracted, charge the *Accompts in Co. Dr. to the accompts-proper*, for their shares of the limitation.

Abatements received, at the payment of goods bought on trust, may be considered as tending to diminish the value of the funds belonging to the company. Abatements granted at receiving payment may be considered as an expence on the goods; and the second entries must be charged accordingly.

6th, When the goods in company are divided, or their value paid in due proportion among the partners, by which the common stock is brought to an issue, charge *each partner his accompt in Co. Dr. to goods in Co.* or, *To Cash*, for the things delivered him, and *Goods proper Dr. to Goods in Co.* for the things taken to yourself; and there is no second entry.

7th, When there are various accompts of goods, voyages, and the like, you may raise an accompt of *Profit and Loss in Co.* and transfer the balance of the several accompts of goods in Co. to it when they are all sold. Then, if the trade afford profit, enter

Profit and Loss in Co. Dr. to Sundries.

To each partner his Accompt in Co. for his share of gain.

To Profit and Loss for your own share;

And reverse that entry if the trade be attended with loss. This will balance the accompts in Co. to a point.

§ 105. The method we have been explaining is attended with considerable trouble; and although it has the appearance of being agreeable to strict form, it does not answer every purpose which the accomptant ought to aim at. It does not exhibit the articles you pay into the company, or draw out, in any one accompt; but if you desire to find them, you must search the cash-accompt, and the

the accompts of your proper goods, and perhaps more. Another inconvenience is, that you cannot lay before the company a state of their affairs, without either the trouble of transcribing, or the disagreeable necessity of submitting your private business, which is recorded in the same books, and intermixed with their transactions, to their inspection. For these reasons we recommend it as a better way, to open separate books for every branch of trade in which partners are concerned with you. And we shall not detain the learner with an explanation of any shorter methods, as they are still more defective than the former. These methods may have their use on some occasions; but the accountant who understands the regular one, will easily adapt it, by proper abridgments, to the particular circumstances of the business.

D. Partnership in separate books.

§ 106. The affairs of fixed companies must be kept in separate books; and we have already noticed, that this is by far the preferable method, though the partnership be only occasional.

The ledger, besides the common accompts in proper trade, contains an accmpt in Co. and a proper accmpt for each partner; for the manager as well as the others.

At opening the books, if the company be then commencing, and the partners have agreed on the sum that each is to contribute to the common stock, enter thus, *Sundries Dr. to Stock; Each partner his accmpt proper* for the share that he ought to pay in. Also, *Stock Dr. to Sundries, To each partner his accmpt in Co.* for his share in the company's stock.

If the partners pay in money or goods, in whole or in part, of their shares, enter

Sundries Dr to Stock.

Cash, for money paid in.

Goods, or the like, for articles received.

Partners Accompts-proper, for the part of their shares unpaid.

Also, *Stock Dr. to Sundries.*

To Partners Accompts-proper, if any of them have paid more than their share, for the excess.

To Partners Accompts in Co. for their respective shares.

If the company has subsisted before, enter the inventory and list of debts in the common form; then enter, *Stock Dr. to Sundries. To each partner his accmpt in Co.* for his proportion of the nett stock.

The entries, during the course of the business, are exactly the same as in proper trade, except the necessary alteration of style to the plural number; *we, us,* and *ours,* instead of *I, me,* and *mine;* and the like.

At balancing the books, if the profits are to be divided, enter *Profit and Loss Dr. to Sundries. To each partner his proper accmpt* for his share.

If the profits be accumulated to increase the stock, enter *Profit and Loss Dr. to Stock*, for nett gain, and *Stock Dr. to the partners accmpt in Co.* for their shares. If the profits be partly divided, and partly accumulated, both entries must be made for the respective proportions.

Thus the accmpts in Co. will exhibit the share belonging to each partner. The proper accmpts will contain the transactions between the partners and company, and show what the one is indebted to the other. The stock accmpt will always balance of itself; and the other accmpts will balance as in proper trade. If there be money kept apart for the company's affairs, it is entered on a cash-accmpt, as in proper trade: But if the manager has other business, and acts as banker for the company, retaining the money he draws for them, and paying their debts, there will be no cash-accmpt; and the manager's proper-accmpt is *Dr.* for all he receives, and *Cr.* for all he pays out.

When a partner withdraws or assigns his share, or a new one is admitted, or the proportions of their shares are altered, it is usual to balance the books, and open others for the new copartnery. But if you choose to continue the old ones, you may introduce the change in the partnership by the following entries:

Sundries, viz. The old partners their accmpts in Co. Dr. to Stock for their former shares.

Stock Dr. to Sundries. To the new partners their accmpts in Co. for their future shares.

And the balance of one partner's proper-accmpt may be transferred to another, according to agreement among the partners.

If the partner who comes in pay money to the partner who withdraws for his share of the stock, the settlement is made between themselves, and is not introduced into the company's books; but if the new partner pay in money to the company, and thereby the common stock be increased, charge *Cash*, if paid down, or the *New partner*, if the payments be deferred, *Dr. to Stock*, before you charge stock *Dr.* to the new partner's accmpt in Co.

The following Set of Books comprehend an extensive course of transactions in various branches of business. The foregoing rules are exemplified and referred to; and a few explanatory notes are annexed on such articles as require them. In the computations the fractions of a penny are neglected.

London, 1 JANUARY 1772.

INVENTORY of money, goods, and debts, belonging to William Parker merchant in London.

Ready money	-	-	-	L. 205	8	6
500 qrs. barley, at 24s.	-	-	-	600	—	—
310 cwt. allum, at 17s.	-	-	-	263	10	—
100 bags Spanish-wool, qt. each 190 lb. is 19000 lb. at 2s. 4d.	-	-	-	2216	13	4
Providence plantation, Barbadoes, under the care of D. Mason my overseer, value, including stocking	-	-	-	1500	—	—
A house in Fleet-street, value	-	-	-	860	—	—
One third share of Ship Diligence, Ja. Byron master, value L. 2400	-	-	-	800	—	—
Ja. Hartley, Cornhill, owes me per accompt	-	-	-	438	4	1
Ja. Ritchie, Glasgow, per ditto	-	-	-	540	—	—
Fitzherbert and O'Haro, Dublin, L. 300, Irish Ex. 7 per cent.	-	-	-	280	7	5
And I have the following bills,						
J. Rossiter on W. Pemble, 15 Nov. 6 mdt.	-	-	-	L. 160	—	—
G. Byron on J. Hill, 15 Dec. 3 mdt.	-	-	-	585	—	—
My bill on Evans and Fenton, 12 Oct. 1 ddt.	-	-	-	300	—	—
				1045	—	—
See § 28, 56.						

8749 3 4

LIST of debts due by the said William Parker.

To J. Vernon Bristol, per accompt	-	-	-	L. 150	9	2
To J. Gordoqui, Bilboa rials 4000 plate, Ex. 3s. 6d.	-	-	-	87	10	—
To Pierre Dupont Bourdeaux, Lrs. 1575, Ex. 30d.	-	-	-	65	12	6
To A. and T. Hopp Amsterdam, f. 12500 at 22 d. per f.	-	-	-	1145	16	8
And the following bills,						
To Ed. Wynne, 28 Sept. 9 mdt.	-	-	-	L. 500	—	—
To Jo. Priestly, 16 Oct. 6 mdt.	-	-	-	270	—	—
				770	—	—
See § 28, 58.						

2219 8 4

TRANSACTIONS in trade by the said Will. Parker.

Sold for ready money 100 qrs. barley, at 25s	-	-	-	125	—	—
Sold J. Hartley 20 bags Spanish-wool, qt. each 190 lb. is 3800 lb. at 2s. 5d.	-	-	-	459	3	4

London, 9 JANUARY 1772.

Paid J. Gordoqui's bill on me to P. Vasconscello, 6 Nov. ufa. being value of R. 2400, Ex. 3s. 6d.		52	10	—
§ 61.				
10.				
Bought from J. Wilcoat 200 ps. linen, qt. each 25 yards, is 5000 yards, at 1s. 3d. L. 312 : 10s.				
Paid in money	L. 156 5 —			
And granted my bill 6 mdt. for balance	156 5 —			
§ 58.		312	10	—
14.				
Sold for ready money, 130 cwt. allum, at 17s. 6d.				
	L. 113 15 —			
12 bags 2280 lb. Spanish-wool, at 2s. 6d.		285	—	—
16.		398	15	—
Shipped, per the Mercury, William Hanway, for Madeira, consigned to J. Velasquez merchant there,				
76 ps. linen, qt. 1900 yards, at 1s. 3d.		L. 118	15	—
50 ps. stuffs, bo. from J. Hartley, at 24s.		60	—	—
3 boxes hardware, bo. from J. Hawkins, per bill 9 mdt.		74	12	—
40 muskets at L. 1 : 16s.		L. 72	—	—
20 pair pistols, at L. 2 : 2s.		42	—	—
Being bought for ready money L. 114		—	—	—
Charges at shipping		2	6	—
§ 75. 1st.		116	6	—
Made insurance at J. Hazard's office on L. 400 value in goods, per the Mercury, Hanway, from London to Ma- deira, at 6 gs. per cent. policy 7s. 6d.		25	11	6
18.				
Drawn on Fitzherbert and O'Haro, To J. Ritchie, 21 dft. L. 200 Irish, Ex. 6½		L. 187	15	10
To J. Hartley do. 100 do.		93	17	11
§ 63. L. 300		281	13	9
20.				
Received payment of J. Ritchie's bill on Hog and Kin- loch, 17 Nov. 2 mdt.		§ 59.	—	—
Sold for ready money, 200 qrs. barley, at 25s. 6d.		L. 255	—	—
12 ps. linen, qt. 300 yards at 1s. 4d.		20	—	—
		275	—	—

London, 20 JANUARY 1772.

Bought for ready money C. Adair's bill on J. Gomez, ufa.

R. 1600 plate, and remitted the same to J. Gordoqui,

Ex. 3s. 5d.

§ 64.

34 3 4

Gained by exchange on Joseph Gordoqui's accompt

§ 77.

— 16 8

Sold Hen. Wren, per bill 8 mdt. 100 cwt. allum, at 17s. 10d.

§ 56.

89 3 4

Received payment of bill on Evans and Fenton, 12 Oct.

1 dd.

L. 300 — —

Interest on ditto

4 8 9

304 8 9

London, 1 FEBRUARY 1772.

Received from Ben. Lincoln, Virginia, per the Leopard,

James Dun master, to sell on his acc. 150 hds. tobacco,

qt. each 850 lb. is 127500 lb.

Deduct shrinkage, at 10 lb. per hd. 1500

126000 lb.

Paid old subsidy on 126000 lb. at $\frac{1}{4}$ d. per lb. L. 393 15 —

Freight on 150 hds. at 21s. 157 10 —

Charges at landing 5 5 —

L. 556 10 —

And given bond for the remaining duties

at $5\frac{2}{3}$ d. per lb. 2826 5 —

Note A.

3382 15 —

Sold Henry Aislaby, per bill 3 mdt.

12 ps. 300 yards linen, at 1s. $4\frac{1}{2}$ d. L. 20 12 610 bags Spanish-wool, 1900 lb. at 2s. $5\frac{1}{4}$ d. 231 11 3

252 3 9

Paid Adrian and Tho. Hopp's bill on me to Lionel Clare,

1st Jan. ufa. being value of f. 3000 banco, Ex. 35s. 2d.

Agio 3 per cent. f. 3090 current 284 7 2

§ 59.

Shipped by order, and for accompt of Jacques Barneveldt,

Amsterdam, per the Eagle, Lestock, 50 hds. of B. Lin-

coln's tobacco, qt. 42000 lb. deliverable free on board,

at $2\frac{1}{2}$ d. L. 415 12 6

Paid charges at shipping 5 5 —

Note B

420 17 6

London, 13 FEBRUARY 1772.

James M^cMorrice, Cork, has shipped at my desire, per the Dolphin, Fitzpatrick, a cargo provisions for Barbadoes, consigned to D. Mason, viz.

150 barrels beef, at	L. 2 3 —	L. 322 10 —
60 ditto pork	2 18 —	174 — —
50 ditto herrings	1 2 —	55 — —
5 firkins tongues	1 6 —	6 10 —
50 firkins butter	1 — 6	51 5 —
Charges at shipping	- -	3 5 —

L. 612 10 —

His com. on L. 612 : 10s. at 2 per cent.

12 5 —

Exchange 7 per cent. Irish L. 624 15 —

583 17 6

Shipped for Bourdeaux, per the Intrepid Lafcelles, 50 hds.

B. Lincoln's tobacco, qt. 42000 lb. sold to P. Dupont, at 4½ fol. is Lrs. 9450 — Ex. 30½ L. 400 6 3

Charges 91 10

3 17 6

404 3 9

Note C Lrs. 9541 10

Made insurance, at J. Hazard's office, on L. 600, value in goods, per the Dolphin, Fitzpatrick, from Cork to Barbadoes, at 5 gs. per cent. policy, 7s. 6d. L. 31 17 6

And L. 425 value in goods, per the Eagle, Lestock, from London to Amsterdam, on account of J. Barnevoldt, at 2 gs. per cent. policy, 7s. 6d.

9 6 —

Note D.

41 3 6

15.---

Bought for ready money,

140 qrs. barley, at 24s. 9d.

L. 173 5 —

30 ps. muslin, 20 yds. each, is 600 yds. at 5s. 150 — —

323 5 —

17.---

Ja. M^cMorice has drawn on Fitzherbert and O'Haro, on my acco.

Irish.

4 cur. 6 mdt.

L. 312 7 6

Do. 9 mdt.

312 7 6

Exchange 7 per cent.

L. 624 15 —

583 17 6

§ 64.

20.---

Sold Ja. Drapier, per bill 3 mdt. 25 bags Spanish wool, qt. 4750 lb. at 2s. 5½d.

583 17 1

22.---

Sold J. Garner, for home consumption, the remaining 50 hds. of B. Lincoln's tobacco, qt. 42,000 lb. at 7¾d. per bill 6 mdt.

1356 5 —

London, 23 FEBRUARY 1772.

Discounted the following bills at the Bank of England,
 My bill on H. Aislaby, 1 cur. 3 mdt. L. 252 3 9
 on J. Drapier, 20 cur. 3 mdt. 583 17 1
 on J. Garner, 22 cur. 6 mdt. 1356 5 —

L. 2192 5 10

Received for the above bills,
 And the discount is
 Note E.

L. 2148 15 4
 43 10 6

2192 5 10

24.---
 Paid duty on 42,000 lb. of B. Lincoln's tobacco, sold for
 home-consumption, at 4 $\frac{1}{4}$ d. L. 824 6 6
 Abated for prompt payment 117 15 2

942 1 8

Retired my bond of L. 2826 : 5s. from the customhouse,
 the remaining duties being discharged by the cargoes
 exported to Amsterdam and Bourdeaux, amount

1884 3 4

Received back the old subsidy on 84000 lb. tobacco, ex-
 ported to Amsterdam and Bourdeaux
 Note F.

262 10 —

28.---
 Paid James Vernon's bill on me, E. Bruce, 25. ult.
 1 mdt. L. 150 — —
 J. Ritchie's bill to J. Winter, 26. ult. 30 dd. 175 — —
 J. Hartley's bill to J. Hill, 25. ult. 1 mdt.
 L. 200 — —
 to J. Turner, 3 dft. 150 — —

350 — —

675 — —

London, 1. MARCH 1772.

Sent accompt sales to B. Lincoln,
 Charged him cellar-rent, and incidents L. 6 10 —
 Insurance of debts on L. 2176, at 1 $\frac{1}{4}$ per cent. 27 4 —
 Commission on 150 hds. at 7s 6d. 56 5 —
 Interest on J. Garner's bill L. 1356 : 5s for 6
 months 33 18 —
 Nett proceeds carried to his acco. current 924 15 3
 § 75. 3d, 4th

1048 12 3

2.---
 Paid A. and T. Hopp's bill on me to J. Vervins, 24. ult.
 ft. being value of f.9135:18 banco, agio 3 per cent. is
 f.9410 current, in full of the balance due them, ex.
 35s. 3d.

863 18 3

London, 2 MARCH 1772.

Loft by exchange on A. and T. Hopp's accompt	2	8	9
§ 77.			
4.			
Ja. Vernon has shipped, by my order, per the Nancy, Dudington, from Bristol to Virginia, a cargo goods, on acco. and risk of B. Lincoln, amount, p. inv. L. 630 — —			
Com. on ditto, 2 per cent. L. 12 : 12s.			
Of which $\frac{1}{2}$ allowed to ditto Vernon - 6 6 —			
And $\frac{1}{2}$ to myself - 6 6 —			
Note G. — — — — —	642	12	—
6.			
Bought from J. Harman, per bill 6 mdt. 200 casks cyder, at 7s. 6d. - - -	75	—	—
Bought from J. Danby, 300 casks cyder, at 8s. L. 120			
Delivered him, in part payment, 50 qrs. barley, at 25s. L. 62 10 —			
And in money - - - 57 10 —	120	—	—
8.			
Drawn on A. and T. Hopp to J. Vernon, 10 dft f. 2000 current at 22 $\frac{1}{2}$ d. - - -	187	10	—
§ 67.			
10.			
Received advice from J. Dickenson, New York, that he has purchased for me the ship Liberty, burthen 200 tons, at L. 3 : 10s. per ton - L. 700 — —			
And having engaged Will. Hooper, master, has loaded a cargo timber, consigned to D. Mafon, Barbadoes, amo. with charges, per invoice, - - - 650 — —			
Exchange 160 per cent. currency L. 1350 — —	843	15	—
Note H.			
Sold for ready money 10 cwt. alum, at 17s. 11d.	8	19	2
11.			
Drawn on Pierre Dupont, for ready money to C. D'Eon, ufance Lrs. 7966:10, ex. 30 $\frac{1}{2}$ d. -	337	9	4
Loft by exchange on P. Dupont's accompt -	1	1	11
14.			
Bought 300 qrs. barley, for ready money, at 23s. 9d. L. 356 5 —			
400 do. from J. Ellis, per bill 3 mdt. at 24s. - 480 — —			
700 — — — — —	836	5	—

London, 16 MARCH 1772.

Bought from J. Lardbroke, per bill 3 mdt. 1000 bush. Spanish falt, at 1s. 5d. - - -	70	16	8
-18. - - -			
Received payment of G. Byron's bill on Ja. Hill, 15. Dec. 3 mdt. - - -	585	-	-
-20. - - -			
Jacques Barneveldt has paid A. and T. Hopp, on my ac- count, for the cargo tobacco, ex. 35s. 4d. f. 4504:4 banco, agio, $3\frac{1}{4}$ per cent. f. 4650:11 curt.	424	18	6
Paid James Ritchie's bill on me to J. Darling, 17 ult. 1 mdt. - - - L. 85 - - -			
And B. Lincoln's bill to J. Stone, 30 dft. 300 - - -	385	-	-
-21. - - -			
Engaged the sloop Grampus, Geo. Hardie master, for the Newfoundland fishery, Shipped 500 buthels falt, at 1s. 5d. L. 35 8 4 Casks bought from T. Cooper, per bill 4 mdt. 56 16 8 Advanced the master - - - 63 - - -			
Note I. - - -	155	5	-
Sold William Blackney, 100 casks cyder, at 8s. - - - L. 40 - - - 100 qrs. barley, at 24s. 6d. - - - 122 10 - - -			
- - - L. 162 10 - - -			
Received in part - - - L. 62 10 - - - And his bill 3 mdt. for balance - - - 100 - - -			
Note K. - - -	162	10	-
-23. - - -			
Shipped per the Diana, Fenwick, for Amsterdam, by order, and for account of J. Barneveldt, 800 qrs. barley, at 22s. 6d. - - - L. 900 - - - Paid charges at shipping - - - 8 12 - - -			
-25. - - -	908	12	-
Contracted with Tho. Smith, Newcastle, for 10 tons alum, to be delivered me at London on or before 1 June, at 16s. per cwt. - - -	160	-	-
§ 89. - - -			
-27. - - -			
Received debenture for bounty on 800 qrs. barley, ex- ported to Amsterdam, at 2s. 6d. L. 100 And sold the same at 5 per cent. discount - - -	95	-	-
Note L. - - -			
-28. - - -			
Paid J. Steinhoff of Gottenburgh's bill on me, on ac- count of Ja. Ritchie, 25 Jan. 2 ufa. - - -	76	12	-
X x 2			

London, 29 MARCH 1772.

Sold 500 bush. falt to James Pemble, at 1s. 5½d.

L. 36 : 9 : 2

Received in part

And his bill on W. Crosbie, 2 mdt.

L. 16 9 2

20 — —

36 9 2

31.

Paid small charges on my business, for 3 months L. 12 7 6

My own expences

70 — —

82 7 6

London, 1 APRIL 1772.

Shipped for Barbadoes, per the Swift, Turner, consigned to D. Mason,

30 ps. linen, qt. 750 yards, at 1s. 3d. L. 46 17 6

20 ps. mullin, 400 yards, at 5s. 100 — —

20 ditto 400 yards, bought for

ready money, at 6s. 120 — —

80 reams foolscap paper, at 13s. L. 52 — —

40 reams demy, at 22s. 44 — —

96 — —

bought from J. Hartley, 6 m. cr.

1526 lb. wrought iron, at 6½d. L. 41 6 7

728 lb. wrought copper, 1s. 4d. 48 10 8

89 17 3

bought from J. Hammerman, per bill 9 mdt.

1 box jewellery, from J. Standart, per bill 6 mdt. 85 — —

Charges at shipping 2 10 —

§ 73. 1ft. — —

540 4 9

2.

Received from J. Hartley, to accompt

—

200 — —

3.

Received for J. Hogg, on Penant and Johnson, remitted

by J. Ritchie, 1 ult. 30 ddt. L. 268 12 —

And for do. Ritchie's bill on Warren & Co. ft. 135 15 —

404 7 —

Paid Thomas Smith in part

—

60 — —

Shipped per the Polly, Beatson, for New York, for acc. of J. Dickenson,

20 ps. linen, qt. 500 yds. at 1s. 4d. L. 33 6 8

30 ditto qt. 750 bo. for ready mo. at 1s. 6d. 56 5 —

40 ditto qt. 1000 bo. from J. Wren, per

— bill 3 mdt. 1s. 8d. 83 6 8

90 2250

Paid charges at shipping, 1 3 8

ex. 160 per cent. L. 278 : 11 : 2 currency, — —

174 2 —

§ 75. 6th.

London, 3 APRIL 1772.

Sold 25 bags Spanish wool, for ready money,			
qt. 4750 lb. at 2s. 5d.	L. 573	19	2
5 do. 950 to J. Hartley, 3 mo. cr.			
at 2s. 5½d.	-	115	15 7
3 do. 570 to J. Webb, at 2s. 5½d.			
per bill 3 mdt.	70	13	1
33 6270		760	7 10
5.			
Received from H. Valville Bourdeaux, per the Bienfaissant,			
J. Reaumeur, 30 pipes claret, to sell on his accompt,			
Paid duty on 15 tons, at L. 66—5½ ⁰ per ton	L. 990	7	5
Freight of 30 pipes, at 35s.	-	52	10 —
Charges at landing	-	2	12 7
\$ 75. 1ft.		1045	10 —
6.			
Bought from J. Hartley, 4 months credit,			
200 qrs. barley, at 24s. 3d.	L. 242	10	—
20 pipes Port-wine, at L. 32 : 12s.	652	—	—
		894	10 —
10.			
Sold J. Almond, vintner Bishopgate-street,			
5 pipes Port wine, at L. 34 : 13s.	L. 173	5	—
5 do. H. Valville's claret, at L. 58 : 10s.	292	10	—
15 casks cyder, at 8s.	-	6	—
		471	15 —
12.			
J. Vernon has shipped, by my order, per the Mermaid, Jack-			
son, from Bristol to Barbadoes, consigned to D. Mafon,			
300 dozen bottled beer, at 5s. 4d.	L. 80	—	—
Charges shipping and casks,	-	5	—
His commission on L. 85, at 2½ per cent.	2	2	6
		87	2 6
15.			
Received from J. Vernon a debenture for drawback of ex-			
cise on 100 cwt. glass bottles, exported to Barbadoes,			
at 2s. 4d. L. 11 : 13 : 4, valued at 5 per cent. discount			
L. 11 : 1 : 8,			
Whereof ⅓ is for the bottles sent D. Mafon	L. 3	13	11
And ⅔ belongs to ditto Vernon	-	7	7 9
Note M.		11	1 8
18.			
Sold for ready money,			
50 casks cyder, at 8s. 2d.	L. 20	8	4
50 pieces, qt. 1250 yards linen, at 1s. 4d.	83	6	8
5 pipes H. Valville's claret, at L. 58	290	—	—
		393	15 —
19.			
Paid bill to J. Priestly, 16 October, 6 mdt.	-	270	— —

London, 22 APRIL 1772.

James Farmer, Kingston, advises to have purchased, on my accompt,

200 qrs. wheat, at 44s.	L. 440 — —	
150 ditto 42s.	315 — —	
		L. 755 — —

350

312 qrs. barley 24s. 6d.	L. 382 4 —	
217 ditto 23s. 9d.	257 13 9	
		639 17 9
529	§ 67. 68.	

1394 17 9

Bottled 2 pipes Port wine into 112 dozen 3 bottles,
Paid for bottles, corks, and charges

Note N.

12 3 9

25.

James Farmer has drawn the following bills on my accompt:

On J. Hartley, 20 current, 1 mdt. L. 200 — —

On J. Almond, 21 current, 2 mdt. 271 15 —

§ 62.

471 15 —

28.

Received from J. Almond his bill, 4 mdt. for the balance
of his accompt, and delivered the same to W. Haines,
on accompt of J. Vernon

Note O.

200 — —

London, 1 MAY 1772.

Received advice from J. Velasquez, that he has received
the cargo per the Mercury, Hanway, value, including
insurance,

395 4 6

And that he has shipped, per said ship, 20 pipes Madeira
wine for Barbadoes, on my accompt, consigned to D.
Mason, amount, per invoice, 1960 milrees, at 5s. 6½ d.

543 1 8

4.

Sold for ready money,		
2 pipes H. Valville's claret, at L. 58 : 5s.	L. 116 10 —	
8 ditto, at L. 57 : 10	460 — —	

576 10 —

6.

Shipped, per the Fortunate, James Allan master, for Con-
stantinople, consigned to J. Udney merchant there,

100 yards cloth, at 17s.	L. 85 — —	
22 ditto 12s. 6d.	13 15 —	

L. 98 15 —

Bought from J. Clive, per bill 9 mdt.

Carried

London, 6 MAY 1772.

Brought forward	L. 98 15 —		
12 fadders lead, from T. Smith, at L. 12 : 16s.	153 12 —		
10 boxes hardware, bought for ready money,	L. 180 — —		
Charges at shipping	3 12 6		
	183 12 6		
Insurance on L. 450, at J. Hazard's office,			
at 4½ gs. per cent. with half policy 3s. 9d.	21 9 —		
		457	8 6
Shipped also per said ship, by order and for accompt of J. Udney, 20 hds sugar, qt. each 12 cwt. is 240 cwt. bought from S. Hodgson, per bill 4 mdt. at 48s. per cwt.	L. 576 — —		
Paid charges at shipping	1 10 —		
	L. 577 10 —		
Com. on L. 577 : 10s. at 2½ per cent.	14 8 9		
Insurance on L. 600, at J. Hazard's office,			
at 4½ gs. per cent. with half policy, 3s. 9d.	28 10 9		
Note P.		620	9 6
8.			
Thomas Smith has shipped, on my accompt, per the <i>1st</i> , Willis, from Newcastle for the Baltic, 50 chaldrons coals, amount, per invoice, including duty		78	—
10.			
Paid J. Farmer's bill to I. Richards, 27 April 10 ddt.		400	—
12.			
Received the alum from Thomas Smith, per agreement 25th March		160	—
§ 89.			
Received a half year's rent of my house in Fleet-street		40	—
18.			
Received payment of J. Rossiter's bill on W. Pemble, 15 Nov. 6 mdt.	L. 160 — —		
And from J. Hill, on account of J. Barneveldt	500 — —	660	—
18.			
Paid J. Ritchie's bill on me to A. Murdoch, 15 ult, 1 mdt.	L. 300 — —		
Tho Smith's to J. Perryman, ft.	100 — —		
J. Farmer's to B. Allan, 3 ddt.	200 — —	600	—

London, 20 MAY 1772.

James Farmer advises me that he has shipped from Kingston to Amsterdam, on my accompt, per the Generous, J. Dodson, consigned to J. Barneveldt,

350 qrs. wheat, at 44s. L. 770 — —

212 qrs. barley, at 24s. 6d. 259 14 —

L. 1029 14 —

562

His com. on 562 qrs. at 6d. L. 14 1 —

Charges — 3 8 —

17 9 —

Note Q.

22.—

1947 3 —

Sold 12 doz. Port-wine to J. Hazard,
at 16s. —

L. 9 12 —

45 to J. Almond, at 15s. 6d. 34 17 6

20 for ready money, do. 15 10 —

And taken 10 for my own use, do. 7 15 —

87

67 14 6

Received from J. Farmer, per the Industry, Thomson, the rem. of the barley, being 317 qrs. value, L. 365 3 9

His com. on do. at 6d. per quarter — 7 18 6

Charges paid by him — 2 16 9

375 19 —

25.—

Received a debenture for the bounty on the corn exported to Amsterdam, viz.

350 qrs. wheat, at 5s. — L. 87 10 —

212 barley, at 2s. 6d. — 26 10 —

Which I value at 5 per cent. discount
Note R.

L. 114 — —

108 6 —

Sold for ready money,

10 ps. qt. 200 yards muslin, at 5s. 6d. L. 55 — —

50 casks cyder, at 8s. 6d. — 21 5 —

2 pipes Port-wine, at L. 35 — 70 — —

3 do. H. Valville's claret, at L. 58 : 5s. 174 15 —

321 — —

Paid James Hartley — —

300 — —

31.—

Underwrote, at J. Hazard's office,

L. 70 per the Norfolk, Hume, from London to Grenada,
at 5 gs. per cent. — L. 3 13 6

50 per the Dispatch, Pritchard, from London to
Peterburgh, at 2½ gs. — 1 6 3

Note S.

4 19 9

London, 1 JUNE 1772.

Received payment of J. Pemble's bill on W. Crosbie, 29th March, 2 mdt.	20	—	—
3.			
Received payment of A. and T. Hopp's bill on H. Van Sittart, 16 March, $2\frac{1}{2}$ ufa. being value of $\text{f. } 2650 : 11$ current, agio $3\frac{1}{4}$, is $\text{f. } 2567 : 2$ banco, ex. 35s. $4\frac{1}{2}$ d.	241	17	11
5.			
Bought for ready money the following bills, H. Johnson, on W. Le Maitre Paris, 60 ddt. Lrs. 2000, ex. $29\frac{1}{2}$ d.			
J. Crosbie, on N. Ruiter Amsterdam, ufa. $\text{f. } 1000$ banco, at 22d.	L. 81	18	10
B. Baker, on A. Pinto, Lisbon, ufa. milrees 1000, at 5s. 7d.	91	13	4
$\text{f. } 63.$	279	3	4
7.	452	15	6
Sold 3 pipes H. Valville's claret to J. Hartley, at L. 57 : 10s. 6 months credit	172	10	—
8.			
Having given a letter of credit on G. Hay, Dantzick, to R. Ellis, ditto Hay has transmitted his bill on ditto Ellis, 1 May, 2 mdt for a cargo timber furnished by him in consequence thereof, $\text{f. } 3750$ Polish, which I charge at 1s.	187	10	—
Note T.			
Geo. Hay has drawn on A. and T. Hopp, on my accmpt, 1 May, ufa. $\text{f. } 1985 : 6$ banco, being value of $\text{f. } 3750$ Polish, ex. 340, agio 3, $\text{f. } 2044 : 17$ current, at $21\frac{1}{2}$ d.	185	6	3
12.			
Sold my glass debenture for	L. 11	—	—
And B. Baker's bill on A. Pinto, milrees 1000, at 5s. $7\frac{1}{2}$ d.	281	5	—
14.	292	5	—
Received from J. Harris, on accmpt of J. Ritchie,	300	—	—
17.			
Paid bill to J. Ellis, 14 March, 3 mdt.	480	—	—
18.			
Sold J. Vernon J. Crosbie's bill on N. Ruiter, $\text{f. } 1000$ banco, at $22\frac{1}{4}$ d.	92	—	3
Received advice from C. Meldrup, Copenhagen, that he has received and sold the coals per the Isis, Willis, nett proceeds, per accmpt sales Rix-dollars 336, at 4s. 3d.	71	8	—

Y y

London, 19 JUNE 1772.

Received advice from D. Mafon, that he has received the cargo per the Dolphin, Fitzpatrick, from Cork, value, including insurance L. 615 15 —

And paid freight and charges on the same,

L. 65 currency, ex. 150 per cent. - 43 6 8

659 1 8

—And that he has received the cargo lumber per the Liberty, Hooper, and sold the same, viz.

Currency. Ex. Sterling.

For ready money L. 432 — — 150 L. 288 — —

On credit - 210 — — do. 140 — —

And taken for the use of

the plantation - 120 — — do. 80 — —

508 — —

L. 762 — —

—And that he has paid charges Currency. Sterling.
on above cargo - L. 6 9 — L. 4 6 —

And advanced W. Hooper 50 — — 33 6 8

37 12 8

L. 56 9 —

—And that he has shipped, per the Liberty, Hooper, 30 hds. sugar, being the produce of my plantation, qt. each 12 cwt. is 360 cwt. which I value at L. 2

720 — —

—19.
—And that he has shipped, per the Thetis, Penant, for J. Dickenson, New York,

10 puncheons rum of our own plantation, qt. each 80 Gal. Cur. Ster.
is 800 gal. at 3s. 4½ d. L. 135 — — L. 90 — —

30 ditto, bought for ready money, qt. 2400 gallons, at 3s. 4½ d. - 405 — — 270 — —

360 — —

L. 540 — —

Exchange from Britain to New York, 160, is L. 576

Note U.

Made insurance at J. Hazard's office on

L. 400 — on Ship Liberty, W. Hooper, from Barbadoes to London, at 4^gs. per cent. with half policy - L. 16 19 9

750 — on sugar, per ditto, ditto 31 13 9

48 13 6

Paid bill to J. Lardbroke, 16 March, 3 mdt.

70 1 8

London, 20 JUNE 1772.

A. and T. Hopp advise that they have received from J. Barneveltdt, on my account, $\text{f. } 4433 : 6$ current, ex. 36s. 2d.

408 — —

— And from Christ. Meldrup, a remittance of $\text{f. } 777 : 15$ current, being value of R. D. 336 Danish, ex. with Denmark 8 per cent. and with London 36s. 2d.

71 13 7

Received from A. and T. Hopp their bill on E. Wilmot, 14 current, 2 ufa. L. 288 : 12 : 2, being value of $\text{f. } 3066 : 10$ banco, ex. 35s. 5d. agio $3\frac{1}{4}$, $\text{f. } 3166 : 4$ cur. and discounted the same at the Bank of England.

The sum received is — L. 286 6 5
And the discount is — 2 5 9

Note W.

288 12 2

— 24 —

Received for bill on W. Blackney, 21 March, 3 mdt.

100 — —

— 26 —

Having agreed to open an Exchange-accompt with Philip Darceville, Paris, I have drawn on him 30 ddt.

To W. Hill, for ready money Lrs. 3200 — 30 d. L. 133 6 8
Ex. — — — — —
To J. Vernon 1800 — 75 — —

208 6 8

§ 81, &c. Lrs. 5000 —

— 29 —

Taken the remaining 4 pipes of H. Valville's claret, on my own account, at L. 57 : 10s.

230 — —

§ 75. 2d.

Sent H. Valville's accompt sales of claret,

Small charges during sale — — L. — 9 7

Cellar rent on 30 pipes, at 2s. 6d. — — 3 15 —

Com. on L. 1736 : 5s. at 2 per cent. — — 34 14 6

Nett proceeds, — — — 651 15 11

690 15 —

Remitted H. Valville H. Johnson's bill on W. Le Maitre, 5th current, 60 ddt. Lrs. 2000, ex. 29 $\frac{1}{4}$ d. —

82 12 9

Paid J. Dickenfon's bill on me to D. De Berdt. 60 ddt. ex. 160, L. 400 currency — — —

250 — —

— 30 —

Underwrote on sundry policies at J. Hazard's office this month, per Insurance Book. The amount of the premiums is — — —

8 18 6

London, 30 JUNE 1772.

Paid small charges for 3 months	-	-	L. 5	3	4
My own expences	-	-	90	-	-

95 3 4

London, 1 JULY 1772.

Sold for ready money					
350 qrs. barley, at 25s.	-	-	L. 437	10	-
130 cwt. alum, 15s.	-	-	97	10	-
1 pipe claret	-	-	58	-	-

593 - -

Paid bill to E. Wynne, 28 September, 9 mdt.

500 - -

3. --
Having given J. Beaumont of Hartfield, Esq; a letter of credit on Frederick Brago Lisbon, he advises me that he has supplied him, in consequence thereof, with 1000 milrees, and has transmitted me his receipt for the same, ex. 5s. 7½ d.

281 5 -

Note X.

Remitted P. Darceville Ex. accompt M. Longueville's bill on R. Barbour, 30 ddt. Lrs. 4000, bought for ready money, ex. 29½

163 17 9

4. --
Received payment of G. Hay's bill on R. Ellis, 1 May, 2 mdt. f. 3750 Polish, at 1s.

187 10 -

6. --
My house in Fleet-street being burnt 8th ult. I have received from the Sunfire Insurance-office the value insured in the same

500 - -

Agreed with Arthur Young of Fairfield Kent, for 2 tons hops, of the present year's growth, to be delivered me on or before 30 November, at L. 6 : 5s. per cwt.

250 - -

Paid bill to J. Wren, 3 April, 3 mdt.

83 6 8

8. --
Sold the area in Fleet-street, on which my house stood, for

200 - -

Paid J. Ritchie's bill to J. Lawton,
6 May, 60 dd.

L. 290 - -

J. Farmer's to J. Husband, 5 May, 2 mdt.

being in full of the balance due him

351 7 -

A. Young's to A. Dobson, ft.

100 - -

741 7 -

12. --
Paid bill to J. Wilcoat, 10th Jan. 6 mdt.

156 5 -

London, 12 JULY 1772.

Received per the Ifis, Willis, from Gottenburgh, a cargo iron and deals shipped by P. Mofs, on my accompt, amount per invoice, 17556 copper dollars, ex. 42.

L. 418 — —

Paid freight of 90 tons, at 25s. L. 112 10 —

Duty on 20 tons iron, at

L. 2 : 8 : 6 48 10 —

on 36 C. deals, 1 : 8 : 7½ 51 10 6

Charges at unlading 1 1 6

Note Y.

16. ————— 213 12 —

631 12 —

Sold for ready money,

12 C. deals, at L. 6 : 12s. - - L. 79 4 —

5 tons iron, at L. 18 : 10s. - - 92 10 —

5 pipes port-wine, at L. 34 - 170 — —

18. —————

341 14 —

The Ship Liberty is arrived, and I have received the 30 hds. sugar, value, including insurance L. 751 13 9

Paid duty on 360 cwt. at

4s. 9½d. - L. 86 17 —

Charges unlading - 1 3 6

88 — 6

839 14 3

Received also 70 hds. consigned me by J. Fullerton, to sell on his accompt,

Paid duty on 840 cwt. at 4s. 9½d. L. 202 13 —

Charges unlading - - 2 14 10

24. —————

205 7 10

Received from W. Manley, on accompt of J. Beaumont

300 — —

Sold A. Merrick per bill 12 mdt. 12 C. deals, at L. 6 : 10s. per C. - - - - 78 — —

The freight of my 30 hds sugar, at 25s. is L. 37 10 —
of J. Fullerton's 70 ditto ditto 87 10 —

125 — —

W. Hooper has received from fundries freight of 150 hds. sugar, at 25s. - - - - 187 10 —

W. Hooper's accompt of charges on the Ship Liberty, since purchased, including his own wages, amounts to

215 — —

Sold for ready money, 15 hds. sugar, qt. 180 cwt. at L. 2 : 8s. - - - - 432 — —

London, 24 JULY 1772.

Paid Henry Valvilles bill to A. Hill, 11 cur. 10 dd.

L. 569 3 2

And my bill to J. Cooper, 21 March, 4 mdt. 56 16 8

625 19 10

30.

Bought from J. Hartley, his bill on W. Le Maitre, Paris, 60 dd. and remitted the same to P. Darceville, on our ex. acco. Lrs. 1500, Exchange 29 d.

60 8 4

London, 1 AUGUST 1772.

Ja. Ritchie's bill on J. Benson, 29 June, 30 dd. being refused, I have returned the same with protest, L. 350 — —

Paid charges of protest 6 9

Note Z.

350 6 9

3.

Jacques Barneveldt advises that he has received the cargo per the Generous, Dodson. and sold the same to sundries on credit, nett proceeds, per accompt sales, f. 13462, ex. 36s. 1d.

1243 12 —

Contracted with A. Young for 1000 qrs. barley of this year's crop, to be delivered me on or before 1 Feb. next, at 24s.

1200 — —

5.

J. Beaumont has received from J. Spendoza, Madrid, in consequence of a credit from me, 200 pistoles, for which he has transmitted me his receipt, is Rials 6400, ex. 3s. 7d.

143 6 8

J. Spendoza has drawn on F. Brago, on my accompt, ufa. milrees 502½. being value of Rials 6432, ex. from Madrid to Lisbon 625, and from London to Lisbon, 5s. 6½d.

139 4 8

J. Spendoza charges for commission on R. 6400, at ½ per cent. R. 32.

Note AA.

7.

Sold for ready money,

2 pipes port at	L. 33 : 10s.	L. 67 — —
12 dozen ditto	15s. 4d.	9 4 —
25 cwt. alum	14s.	17 10 —
3 tons iron	L. 17 : 17s.	53 11 —
5 hds. sugar. qt. 60 cwt.	L. 2 : 7s.	141 — —

288 5 —

London, 8 AUGUST 1772.

Received advice from D. Mason that he has received the
 cargo per the Swift, Turner, L. 540 4 9
 And the cargo from Bristol, per the
 Mermaid, Jackson, - - 83 8 7

623 13 4

—And that he has sold goods as follows:

	Currency.	Sterling.
For ready money	L. 765 18 —	L. 510 12 —
On credit	369 9 —	246 6 —
Taken for the plantation	171 — —	114 — —

870 18 —

Ex. 150 per cent. L. 1306 7 —

—And that he has received the cargo Madeira wine, per
 the Mercury, Hanway, and sold the same as under,
 10 pipes for ready money, Currency. Sterling.

at L. 51: 6s	L. 513 — —	L. 342 — —
2 ditto damaged, do. at		
L. 27	54 — —	36 — —
8 on credit, at L. 53	424 — —	282 13 4

660 13 4

20 L. 991 — —

—And that he has paid freight and charges on the cargo,

	Currency.	Sterling.
Per the Swift, Turner,	L. 80 9 6	L. 53 13 —
Per the Mermaid, Jackson,	18 7 6	12 5 —
Per the Mercury, Hanway,	115 1 —	76 14 —

142 12 —

Note B. B. L. 213 18 —

—And that he has shipped for B. Lincoln 15 cwt. cotton,
 being the produce of our plantation, at L. 8: 4s, L. 123
 currency

82 — —

11.
 Paid Tho. Smith's bill on me to Surtees and Burdon,
 8 June, 2 mdt. in full of the balance due him -

231 12 —

15.
 Shipped for Hamburg, per the Fair Trader, Warren, con-
 signed to J. Thornton there,

200 qrs. barley from my granary, at 25s. L. 250 — —
 300 do. from W. Bakewell, per bill 2 mdt.

at 25s. - - 375 — —
 10 hds. sugar, qt. 120 cwt. at 47s. - 282 — —

Paid charges at shipping - - 2 5 —

909 5 —

London, 17 AUGUST 1772.

Drawn on J. Barneveldt, for ready money, 2 ufa. $\text{f } 3000$
current, to A. Hill, ex. 35s. 6d. - -

281 13 9

H. C.

Sold 12 144 J. Fullerton's sugar to J. Parker, per bill
4 mdt. at 47s. 6d. L. 342 — —

5 60 to J. Hartley 3 mo. cr. do. 142 10 —

20 240 to W. Crosbie, per bill 4 mdt. do. 570 — —

1054 10 —

37 444

19.

F. Brago charges com. on 1000 milrees, at $\frac{1}{2}$ per cent. M. 5.

Paid F. Brago's bill on me to C. Mariot, 16 June, 2 mdt.
being value of 1005 milrees, at 5s. 6 $\frac{1}{2}$ d.

278 9 4

Drawn on P. Darceville, ex. accompt, for ready money,
Lrs. 2400 to J. Sullivan, 30 dd. ex. 30 d. L. 100 — —
5700 to S. Bambridge, 60 dd. ex. 29 $\frac{1}{2}$ d. 236 10 2

336 10 2

Lrs. 8100

22.

Sold Ja. Drayton, per bill 6 mdt.

10 cwt. alum, at 14s. - - L. 7 — —

10 hds. J. Fullerton's sugar, qt. 120 cwt.
at 47s. 3d. - - 283 10 —

100 casks cyder, at 8s. 4d. - - 41 13 4

332 3 4

25.

Sold for ready money,

2 pipes claret, at L. 58 - - L. 116 — —

100 casks cyder, at 8s. 2d. - - 40 16 8

2 pipes Port, at L. 34 - - 68 — —

224 16 8

31.

Paid Ja. Ritchie's bill on me to A. Stewart, 28 July,
30 ddt. - - L. 178 — —

Fitzherbert and O'Haro's to L. O'Brien, 10 ddt.

L. 312 : 7 : 4 Irish, ex. 9 per cent. 286 11 6

464 11 6

London, 1 SEPTEMBER 1772.

Received advice from Geo. Hardie, dated 18th July, from
St John's, Newfoundland, that he has completed a cargo
fish, and is ready to proceed to the Streights, where he
is to receive my further orders.

The whole expence of the fishery, amounts to -

78 — —

Geo. Hardie has drawn on J. Dickenson, on my account,
L. 100 currency of New York, ex. 160 per cent.

62 10 —

London, 8 SEPTEMBER 1772.

Received drawback of duty on the sugar exported to Ham- burgh	L. 28 19 —			
And bounty on 500 qrs. barley to do. at 2s. 6d.	62 10 —			
		91	9	—
Received from W. Manley, on account of J. Beaumont		200	—	—
Drawn on P. Darceville, ex. account, for ready money, to J. Hart, 1 mdt. Lrs. 3600, ex. 29 $\frac{1}{2}$ d.		149	7	6
Paid bill to J. Harman, 6 March, 6 mdt.	L. 75 — —			
to S. Hodgson, 6 May, 4 mdt.	576 — —			
		651	—	—
Settled with James Byron matter of the Diligence, for my proportion of profits since 1 September 1771, The amount of freight is	L. 860 — —			
of charges	530 — —			
Whereof my $\frac{1}{3}$ share is L. 110	L. 330 — —			
Received in money	L. 60 — —			
And his bill 3 mdt. for the balance	50 — —			
		110	—	—
Sold for ready money, 7 tons iron, at L. 18	L. 126 — —			
12 C. deals, at L. 7	84 — —			
1 pipe claret	57 — —			
		267	—	—
W. Louthier, Liverpool, has purchased on my account 400 barrels falmon, and shipped the same per the In- dustry, Smith, consigned to F. Pizoni, Venice, at 45s.	L. 900 — —			
Charges shipping	5 5 —			
		905	5	—
Received payment of bill on H. Wren, 23 Jan. 8 mdt.		89	3	4
J. Beaumont has received from P. Pignatelli, Rome, on my account, per receipt transmitted me, 500 crowns, ex. 6s. 1d.		152	1	8
A. [unclear] has desired I should pass from the bargain of hops, 6th July, and has paid me, in consideration there- of, the penalty of		10	—	—
Note CC.				

London, 28 SEPTEMBER 1772.

Sold the Ship Liberty for ready money	-	420	—	—
Paid P. Darceville's bill on me to J. Bougainville, ex. acct, 25 ult, ufa. Lrs. 6000, ex. 30 d.	-	250	—	—
Paid small charges for 3 months	-	30	—	—
My own expences,	-	L. 3 5	—	—
	-	100	—	—
		103	5	—

London, 1 OCTOBER 1772.

Received from J. Velasquez accompt sales of the cargo per the Mercury, Hanway, nett proceeds milrees 1625, ex. 5s. 6½ d.	-	450	5	2
J. Velasquez has drawn on F. Brago, on my accompt, ufa. milrees 335, ex. 5s. 6½ d.	-	92	16	6
Paid bill to J. Standart, 1 April, 6 mdt.	-	85	—	—
Having agreed with A. Benson, Lombard-street, and H. Primrose, Leadenhall-street, to trade in company to Lisbon, each one-third concerned, I have shipped on our joint account, per the True Briton, Fisher, consigned to F. Brago,				
100 qrs. of my barley, at 24s. 6d.	L. 122 10	—		
Cloth furnished by A. Benson	300	—		
Hardware, bought from J. Hawkins, per bill 3 mdt.	136	—		
Shoes bought from N. Pemberton, for ready money	75	—		
Charges shipping	3 4	—		
* * * * *		636	14	—
A. Benson's third share of above is	-	212	4	8
H. Primrose's ditto	-	212	4	8
* * * * * \$ 104, 2d.				
Sold to J. Garner, per bill 2 mdt.				
83 casks cyder, at 8s.	L. 33 4	—		
10 hds. J. Fullerton's fugar, qt. 120 cwt. at 47s.	282	—		
		315	4	—
Taken for family use 1 cask cyder	-	—	8	—
The remaining cask is damaged, and quite uselefs.				

London, 9 OCTOBER 1772.

Received advice from J. Thornton, that he has received and sold the cargo per the Fair Trader, Warren, nett proceeds, per accompt sales, merks-lubs 13460, at 16½d. Whereof he has received M. 6730 L. 462 13 9 And the balance, 3 months cr. 6730 462 13 9 § 73, 2d.			925	7	6
M. 13460					
—And that he has paid P. Mofs's bill on him, on my ac- compt, 18 July, 2 mdt. M-lubs 5976:8, at 16½d. be- ing value of copper-dollars 17556, ex. 11¼.			410	17	8
12.--					
Received bounty on 400 barrels falmon, at 4s. 6d. L. 90 — — 100 qrs. barley, 2s. 6d. 12 10 —			102	10	—
* * * * *					
A Benfon's one-third of bounty on barley is —			4	3	4
H. Primrose's ditto —			4	3	4
§ 104. 4th, 5th.					
17.--					
Sold J. Vernon the remaining 13 hds. of J. Fullerton's fu- gar, qt. 156 cwt. at 4s. 8d. — —			364	—	—
Sent accompt sales of fugar to J. Fullerton, Cellar-rent and charges — L. 3 13 10 Com. on L. 1984, at 2 per cent. — 39 13 7 Insurance of debts on ditto, at 1½ per cent. — 29 15 2 Nett proceeds — — 1617 19 7			1691	2	2
18.--					
Paid bill to J. Hawkins, 16 Jan. 9 mdt. L. 74 12 — to W. Bakewell, 15 Aug. 2 mdt. 375 — —			449	12	—
20.--					
Agreed to take one-half concern with R. Tompkins, Al- dergate, in a quantity East India goods purchased by him, viz.					
Tea — — L. 315 — — Pepper — — 128 — — Mullin — — 201 — —					
L. 644 — —					
Whereof my half share is —			322	—	—
§ 98. 2d.					
Drawn on J. Barneveldt, to R. Tompkins, 25 dft. f. 3000, at 22¼d. — —			278	2	6
Z z z					

London, 20 OCTOBER 1772.

H. Primrose has settled accompts on the voyage to Lisbon,
by paying to A. Benfon - L. 91 18 8
to me - 116 2 8

25.
Received payment of J. Thornton's bill on L. Golbourn,
22 ult. ufa. being value of M. 753:8 current lubs, agio
15, M. 665:3½ banco, ex. 33s. 10d. -

30.
R. Tompkins acquaints me that he has sold our tea for
ready money, at L. 325, whereof my half share is
£ 98. 4th.

Received from R. Tompkins G. Milford's bill on H. Van
Tromp, Amsterdam, ufa. f. 1500 banco, and sold the
same at 22½d. -

31.
Underwrote this month on fundry ships, at J. Hazard's
office, per insurance-book. The amount of the pre-
miums is -

London, 1 NOVEMBER 1772.

Sold for ready money,
5 tons iron, at L. 17:5 - L. 86 5 -
And one half of my share of ship Diligence 300 - -

Received from J. Udney accompt sales of goods per the
Fortunate, Allen, nett proceeds 167250 aspers, at ⅓ d. -

J. Udney has remitted F. Pizoni a bill for 1070 ducats, be-
ing value of 995 10 aspers, at 93 aspers per ducat, ex. 4s. 3d. -

Received from J. Udney his bill on C. Preston, 30 dft.
being value the sugar shipped 6 May, L. 620 9 6
And 3 months interest - 7 15 -
Note DD. -

6.
P. Pignatelli charges for commission on 500 crowns, at
⅓ per cent. 2½ crowns.

P. Pignatelli has drawn on F. Pizoni, on my accompt,
739 ducats, being value of 502½ crowns, ex. 68 crowns
per 100 ducats, at 4s. 3d. per ducat. -

Remitted A. and T. Hopp my bill on J. Udney, ufa.
67740 aspers.

Note EE.

208 1 4

52 8 8

162 10 -

140 12 6

36 10 -

386 5 -

418 2 6

227 7 6

628 4 6

157 - 9

London, 9 NOVEMBER 1772.

The ship Diligence being lost at sea, I have settled with the underwriters for the sum insured on the same, being

L. 1800 — —

Deduct 2 per cent. per agreement

L. 36 — —

And $\frac{1}{2}$ per cent. brokerage

9 — —

45 — —

L. 1755 — —

Whereof my $\frac{1}{8}$ share is L. 292 : 10s. for which received J. Bishop's bill, 1 mdt.

292 10 —

Received payment of J. Barneveldt's bill on I. Philpot, 6 ult. ufa. being value of $\text{f.}7462$ current, agio 3 per cent. $\text{f.}7244 : 13$ banco, ex. 35s. 6d.

680 4 11

Paid J. Fullerton's bill on me to A. Seton, 30 dft.

1000 — —

Received advice from D. Mason that he has sold the remainder of the cargo per the Dolphin and Mermaid, and part of the cargo per the Swift, viz.

Currency. Sterling.

For ready money — L. 245 — — L. 163 6 8

On credit — — 218 — — 145 6 8

To J. Fullerton — — 345 — — 230 — —

Ex. 150

Note FF.

L. 808 — —

538 13 4

—And that he has still on hand part of the cargo per the Swift, valued, per inventory, L. 200 currency
Note GG.

133 6 8

—And that he has recovered debts for goods formerly sold, to the amount of L. 367 : 10s. currency

245 — —

—And that a debt of L. 60, for goods formerly sold, is become desperate

40 — —

Note HH.

—And that he has paid J. Dickenson's bill on him, on my accompt, L. 180 : 19 : 3, being value of L. 195 : 8 : 10 currency of New York, ex. L. 108 of New York, L. 100 of Barbadoes

120 12 10

—And that he has received from B. Lincoln a cargo provisions for the use of the plantation, value L. 160 currency

106 13 4

London, 13 NOVEMBER 1772.

—And that he has shipped, per the West Indian, Jeffries,
the remainder of this year's produce, being
8 hds. sugar, 10 C. each, is 80 C. at 36s. L.144 — —
12 C. ginger, at L.4: 10s. — 54 — —
6 C. pymento, at L.3: 5s. — 19 10 — —

217 10 —

—And that the charges on the
plantation, including his own Currency. Sterling.
salary, amount to L.1383 12 — L.922 8 —
And charges on goods to 48 — — 32 — —
L.1431 12 —

954 8 —

According to the accounts received of the state of the
plantation, it may now be valued at L.800 Sterling.

Note II.

18.

Received from A. Young 500 qrs. barley, in part of quan-
tity contracted for at 24s. — —

600 — —

22.

R. Tompkins acquaints me that he has sold the muslins
for — — L.215 — —
And part of the pepper for — 30 — —

L.245 — —

To J. Hawkesworth, per bill 6 mdt. and he agrees to pay
me my half share, discounting 6 months interest, which
comes to — —

119 8 9

Note KK.

Agreed with R. Tompkins to divide the remainder of
the pepper, being 1400 lb. and received my share 700
lb. at 1s. 6d. — —

52 10 —

Received from R. Tompkins, in full L.97 8 9
from W. Hooper, in full — 5 16 8

103 5 5

Paid a loss of L.70, insured in May last, per the Nor-
folk, Home, from London to Grenada, discount 2 per
cent. — —

68 12 —

30.

Discounted the following bills at the office of Honeywood
and Co.

J. Udney on C. Preston, 30 dft. from 1st cur. L.628 4 6
My bill on J. Bishop, 9 cur. 1 mdt. 292 10 —

Carried forward L.920 14 6

London, 30 NOVEMBER 1772.

Brought forward	L. 920 14 6		
Received for above	L. 919 18 —		
And the discount is	— 16 6		
		920	14 6
Fitzherbert and O'Haro charge for com. on L. 624 : 15s.			
at $\frac{1}{2}$ per cent.	L. 3 2 5		
Postages	— 5 1		
§ 80.	Irish L. 3 7 6		
Paid Fitzherbert and O'Haro's bill on me to C. Lucas,			
14 cur. 14 ddt. L. 315 : 15 Irish, ex. 9 $\frac{1}{2}$ L. 289 — 3			
W. Lowther's bill to T. Green, 27 ult. 1 mdt. 600 — —			
A. Young's to P. Nielson, 17 cur. 10 dd. 450 — —			
		1339	— 3
Underwrote on sundry ships this month, at J. Hazard's			
office, per Insurance-books. The premiums amount to		43	12 6

London, 1. DECEMBER 1772.

F. Pizoni advises that he has received and sold the salmon			
per the Industry, Smith, for ready money, nett proceeds,			
per accompt sales, 3550 ducats, ex. 4s. 3d.		754	7 6
—And that he has received the fish per the Grampus, Har-			
die, from Newfoundland, and sold the same at 3 months			
credit, nett proceeds, 1820 ducats, ex. 4s. 3d.		386	15 —
—That he has paid Geo. Hardie 400 ducats, ex. 4s. 3d.		85	— —
5.			
Drawn on F. Pizoni, for ready money, to J. Bell, ufa. 3481			
ducats, ex. 4s. 3d.		739	14 3
7.			
Remitted P. Darceville ex. accompt, J. Dean's bill on Cha.			
Martinet, 30 ddt. Lrs. 3240, bought for ready money,			
ex. 29 $\frac{1}{4}$ d.		133	17 6
10.			
J. Hunter's bill on R. Mills, 7 ult. 30 dd. indorsed by J.			
Ritchie, and addressed to me in case of need, being pro-			
tested for non-payment, I have paid the same for the ho-			
nour of ditto Ritchie			
			L. 300 — —
Charges			— 7 6
Note L.L.		300	7 6

London, 12 DECEMBER 1772.

Received from F. Brago accompt sales of the cargo per True Briton, Fisher, nett proceeds, milrees 2430, ex. 5s. 6 $\frac{1}{2}$ d. L. 673 : 6 : 3,					
And ditto Brago has shipped, per said ship, in return,					
Wine to H. Primrose	M. 1050	L. 290 18 9			
Salt to A. Benfon	520	144 1 8			
And has given me credit for the bal.	860	238 5 10			
			673	6	3
	M. 2430				
* * *					
A. Benfon's $\frac{1}{2}$ share of nett proceeds, is			224	8	9
H. Primrose ditto			224	8	9
§ 104. 4th.					
The gain on the joint adventure to Lisbon, is L. 49 : 2 : 3					
Whereof A. Benfon's $\frac{1}{2}$ share		L. 16 7 5			
H. Primrose's		16 7 5			
My own		16 7 5			
§ 103.			49	2	3
Paid A. Benfon in full					
A. Young, to accompt		L. 80 7 1			
		300 — —			
19. —			380	7	1
J. Garner being insolvent, I have accepted a composition of 15s. per L. on his bill 7th October, 2 mdt. L. 315 : 48.					
The composition received is		L. 236 8 —			
And the sum lost L. 78 : 16s.					
Whereof, for cyder		8 6 —			
for J. Fullerton's sugar		70 10 —			
Note MM.			315	4	—
19. —					
Geo. Hardie being arrived from Venice, the freight due him for 8 months at the fishery, at L. 25 per month, is			200	—	—
Paid Geo. Hardie in full			67	10	—
20. —					
Received payment of bill on J. Parker, 17 Aug. 4 mdt.			342	—	—
G. Milford's bill on H. Van Tromp, 30 Oct. ufa. being refused in Holland, A. and T. Hopp have paid the same supra protest, for my honour, f. 1500 banco, agio 3 per cent.					
		f. 1545 —			
Charges		3 —			
		f. 1548 —			
And the bill being returned, R. Tompkins has accounted for the same, by indorsing me his bill on A. Pigot, 2 mdt. for the value, at 23 d. per current guilder			148	7	—
3 Note MM.					

London, 20 DECEMBER 1772.

A. and T. Hopp advise that they have negociated my bill on Constantinople, 67740 aspers, at 212 aspers per L. Flemish, is *f.* 1917 : 3 banco, agio 3 per cent. *f.* 1974 : 13 cur. ex. 35s. 6d.

Note DD.

A. and T. Hopp charge for commission on

f. 11836 : 5 at $\frac{1}{2}$ per cent. - *f.* 59 : 3 —

And postages - 5 : 10 —

§ 80.

f. 64 : 13 —

22.

A. and T. Hopp have remitted me their bill on W. Blake, 2 mdt. being value of *f.* 362 current, agio 3 per cent. *f.* 351 : 9 banco, ex. 35s. 6d. being in full of the balance due me

31.

Due J. Hazard for brokerage on L. 94, at 6d. per L.

Paid J. Hazard in full - -

Paid small charges for 3 months - L. 12 12 —

My own expences - - 170 — —

182 12 —

Charged J. Ritchie interest on his accompt L. 29 10 3

Com. on L. 1943, at $\frac{1}{4}$ per cent. 4 17 1

Postages - - — 13 4

And sent him his accompt-current balanced by L. 1107 : 7 : 9 due by him to Dr. new accompt.

The interest due by me on P. Darceville's ex. accompt, is Lrs. 18 : 10 - -

§ 83, &c.

4 16 10

P. Darceville to be credited, inner column, for his half share of gain by exchange, - Lrs. 175 : 9

And for postages - - 19 : 15

186 : 4

My half share of gain by exchange on P. Darceville's accompt is - -

7 1 4

A a a

London, 31 DECEMBER 1772.

P. Darceville's ex. accompt to be balanced by Lrs. 5404:14
due him, ex. 29 d. L. 227:13:9; but first there must
be replaced to Cr. and Dr. new accompt an outstanding
bill, remitted him Lrs. 3240, L. 133:17:6

Charged J. Hartley interest, - - -
And settled accompts, the bal. due me being L. 596:9:10,
carried to Dr. new accompt.
Note OO.

Inventory of goods on hand 31 December.
460 qrs. barley, at 24s. - L. 552 - -
105 cwt. alum, at 14s. - 73 10 -
2 pipes port-wine, at L. 34 L. 68 - -
13 doz. do. 16s. 9 15 -
77 15 -
Note PP.

35 7 3

703

We have omitted the marginal characters and references in the waste-book and journal, which were sufficiently exhibited in Set A. in order to obtain a broader page for the narrations; and, for the same reason, the folio column is omitted in the ledger.

JOURNAL. B.

London, 1 JANUARY 1772.

Sundries Dr. to Stock, for money, goods, and debts, belonging to William Parker, merchant London.

<i>Cash on hand</i>	-	L. 205	8	6
<i>Barley, for 500 qrs. at 24s.</i>	-	600	—	—
<i>Alum, for 310 C. at 17s.</i>	-	263	10	—
<i>Spanish wool, for 100 bags, qt. each 190 lb. is 19000 lb. at 2s. 4d.</i>	-	2216	13	4
<i>Providence plantation, Barbadoes, under the charge of D. Mason, value, including stocking</i>	-	1500	—	—
<i>House in Fleetstreet, value</i>	-	860	—	—
<i>Share of Ship Diligence, Ja. Byron master, for one third, value L. 2400</i>	-	800	—	—
<i>Ja. Hartley, Cornhill, due by him per ac.</i>	-	438	4	1
<i>Ja. Ritchie, merchant Glasgou, do.</i>	-	540	—	—
<i>Fitzherbert and O'Haro, Dublin, do.</i>	-	280	7	5
<i>L. 300 Irish, ex. 7 per cent.</i>	-			
<i>Bills receivable, for the following,</i>				
<i>J. Rossiter on W. Pemble, 15 Nov. 6 mdt.</i>	L. 160	—	—	
<i>G. Byron on J. Hill, 15 Dec. 3 mdt.</i>	585	—	—	
<i>My bill on Evans and Fenton, 12 Oct. 1dd.</i>	300	—	—	
		1045	—	—

8749 3 4

Stock Dr. to Sundries,

<i>To Ja. Vernon, Bristol, due to him per ac.</i>	L. 150	9	2
<i>To J. Gordoqui, Bilboa, ditto R. 4000 plate, ex. 3s. 6d.</i>	-	87	10 —
<i>To Pierre Dupont, Bourdeaux, ditto, Lrs. 1575, ex. 30 d.</i>	-	65	12 6
<i>To A. and T. Hopp, Amsterdam, ditto, f. 12500, at 22 d.</i>	-	1145	16 8
<i>To Bills payable, for the following,</i>			
<i>to E. Wynne, 28 Sep. 9 mdt.</i>	L. 500	—	—
<i>to J. Priestley, 16 Oct. 6 mdt.</i>	270	—	—
		770	— —

2219 8 4

<i>Cash Dr. to Barley, sold 100 qrs. at 25s.</i>	-	125	—	—
	6.			

Ja. Hartley Dr. to Spanish wool, sold him, at 3 ms. credit, 20 bags, qt. each 190 lb. is 3800 lb. at 2s. 5d.

459 3 4

London, 9 JANUARY 1772.

<i>J. Gordoqui Dr. to Cash</i> , paid his bill on me to Pedro Vafconcello, 6 Nov. ufa. being value of Rials 2400 plate, ex. 3s. 6d.		52	10	—
10.				
<i>Linen Dr. to Sundries</i> , for 2000 pieces bought from J. Wilcoat, qt. each 25 yards, is 5000 yards, at 1s. 3d. L. 312 : 10s.				
<i>To Cash</i> , paid in part	L. 156 5 —			
<i>To Bills payable</i> , for my bill to him 6 mdt. for balance	156 5 —	312	10	—
14.				
<i>Cash Dr. to Sundries</i> , <i>To Alum</i> , sold 130 C. at 17s. 6d. L. 113 15 — <i>To Spanish wool</i> , sold 12 bags, qt. 2280 lb. at 2s. 6d. 285 — —		398	15	—
16.				
<i>Voyage to Madeira Dr. to Sundries</i> , for a cargo shipped per the Mercury, William Hanway, consigned to J. Velasquez merchant there, <i>To Linen</i> , for 76 pieces qt. 1900 yards, at 1s. 3d. L. 118 15 — <i>To J. Hartley</i> , for 50 pieces stuffs bought from him, at 24s. 4 m. cr. 60 — — <i>To Bills payable</i> , for 3 boxes hardware, bought from J. Hawkins, per bill 9 mdt. 74 12 — <i>To Cash</i> , for 40 musquets, at L. 1 : 16s. L. 72 — — 20 pair pistols, L. 2 : 2s. 42 — — L. 114 — — and for charges shipping 2 6 — 116 6 —		369	13	—
<i>Voyage to Madeira Dr. to John Hazard</i> insurance-broker London, for insurance made at his office on L. 400 value in goods, per the Mercury, Hanway, from London to Madeira, at 6 gs. per cent. policy 7s. 6d.		25	11	6
18.				
<i>Sundries Drs. to Fitzherbert and O'Hare</i> , <i>Ja. Ritchie</i> , for my bill on them to him, 21 dft. L. 200 — — Ex. 6½ L. 187 15 10 <i>Ja. Hartley</i> , for do. to him, 21 dft. 100 — — 93 17 11 L. 300 — —		281	13	9

London, 20 JANUARY 1772.

Cash Dr. to Ja. Ritchie, received for his bill on Hog and Kinloch, 17 Nov. 2 mdt. -

356 8 —

Cash Dr. to Sundries,

To Barley, for 200 qrs. at 25s. 6d. L. 255 — —

To Linen, for 12 ps. qt. 300 yds, at 1s. 4d. 20 — —

275 — —

J. Gardoqui Dr. to Cash, for C. Adair's bill on J. Gomez, ufa. Rials 1600 plate remitted him, ex. 3s. 5d.

34 3 4

J. Gardoqui Dr. to Profit and Loss, for gain by exchange 23. — —

— 16 8

Bills Receivable Dr. to Alum, sold 100 C. to H. Wren, per bill 8 mdt. at 17s. 10d. -

89 3 4

28. — —

Cash Dr. to Sundries,

To Bills Receivable, for bill on Evans and Fenton, 12 Oct. 1 ddt. - - L. 300 — —

To Interest-accompt, for interest on ditto 4 8 9

304 8 9

London, 1 FEBRUARY 1772.

Ben. Lincoln his Account of Tobacco Dr. to Sundries,

To Cash, paid old subsidy on 126000 lb.

at $\frac{3}{4}$ d. - - L. 393 15 —

and freight on 150 hds. at 21s. 157 10 —

and charges at landing - 5 5 —

L. 556 10 —

To Custom-house bonds, granted bond for the remaining duties, at $5\frac{3}{8}$ d. - 2826 5 —

3382 15 —

having received a cargo of 150 hds. qt. each 850 lb.

is - 127500 lb.

deduct shrinkage 10 lb. per hd. 1500

Nett 126000 lb.

Bills receivable Dr. to Sundries,

To Linen, for 12 pieces, qt. 300 yards, at

1s. $4\frac{1}{4}$ d. - - L. 20 12 6

To Spanish Wool, for 10 bags, qt. 1900 lb.

at 2s. $5\frac{1}{4}$ d. - 231 11 3

Sold Hen. Aislable, per bill 3 mdt. -

252 3 9

London, 4 FEBRUARY 1772.

Adrian and Tho. Hopp Dr. to Cash, paid their bill on me to Lionel Clare, 1 Jan. ufa. being value of $\text{f.}3000$ banco, ex. 35s. 2d. agio 3 per cent. is $\text{f.}3090$ current

284 7 2

10.

Jacques Barneveldt, Amsterdam, Dr. to B. Lincoln, Virginia, his *Accompt tobacco*, shipped on account of ditto Barneveldt, per the Eagle, Lestock, 50 hds. qt. 42000 lb. at $2\frac{3}{4}$ d. deliverable free on board

415 12 6

B. Lincoln, his Accompt Tobacco Dr. to Cash, paid charges at shipping the above

5 5 —

13.

Voyage from Cork to Barbadoes, per the Dolphin, Fitzpatrick, Dr. to Ja. M'Morricz, Cork, for a cargo provisions shipped by him, consigned to D. Mafon, viz.

150 barrels beef, at 43s.	-	L. 322	10	—
60 barrels pork, at 58s.	-	174	—	—
50 barrels herrings, at 22s.	-	55	—	—
5 firkins tongues, at 26s.	-	6	10	—
50 firkins butter, at 20s. 6d.	-	51	5	—
charges shipping	-	3	5	—

L. 612 10 —

his commission on L. 612 : 10, at 2 per cent. 12 5 —

Ex. 7 per cent. Irish L. 624 15 —

583 17 6

Pierre Dupont Dr. to B. Lincoln, his Accompt tobacco, shipped on his account, per the Intrepid, Lafcelles, 50 hds. qt. 42000 lb. at $4\frac{1}{2}$ sols, is

Lrs 9450 —	ex. $30\frac{1}{2}$ d.	L. 400	6	3
charges	-	91	10	3 17 6

404 3 9

Lrs. 9541 10

B. Lincoln his account Tobacco Dr. to Cash, for charges on above cargo

3 17 6

Sundries Dr. to Jo. Hazard,

Voyage from Cork to Barbadoes, for insurance of L. 600 value in goods, per the Dolphin, Fitzpatrick, at 5 gs. per cent. policy 7s. 6d.

L. 31 17 6

Jacques Barneveldt, for insurance on L. 425 value in goods, per the Eagle, Lestock, from London to Amsterdam, at 2 gs. per cent. policy 7s. 6d.

9 6 —

41 3 6

London, 15 FEBRUARY 1772.

<i>Sundries Dr. to Cash,</i>					
Barley, for 140 qrs. at 24s. 9d.	-	L.173	5	-	
Muslins, for 30 ps. qt. each 20 yards, is 600 yards, at 5s.	-	150	-	-	
				323	5 -
17.					
<i>Ja. M^cMorrice Dr. to Fitzherbert and O'Haro, for his bills on them on my accompt, viz.</i>					
					Irish.
4 current, 6 mdt.	-	L.312	7	6	
ditto 9 mdt.	-	312	7	6	
				583	17 6
Ex. 7 per cent.			L.624	15	-
20.					
<i>Bills receivable Dr. to Spanish wool, sold J. Drapier, per bill 3 mdt. 25 bags, qt. 4750 lb. at 2s. 5½d.</i>					
				583	17 1
22.					
<i>Bills receivable Dr. to B. Lincoln, his Accompt tobacco, Sold J. Garner, per bill 6 mdt. for home consumption, the remaining 50 hds. qt. 42000 lb. at 7¾d.</i>					
				1356	5 -
23.					
<i>Sundries Drs. to Bills receivable, for the following bills, discounted at the Bank of England,</i>					
my bill on H. Aislaby, 1 current, 3 mdt.	L.252	3	9		
do. on J. Drapier, 20 cur. 3 mdt.	583	17	1		
do. on J. Garner, 22 cur. 6 mdt.	1356	5	-		
	L.2192	5	10		
<i>Cash, received for above</i>			L.2148	15	4
<i>Interest-accompt, for discount on do.</i>			43	10	6
				2192	5 10
24.					
<i>Customhouse Bonds Drs. to Sundries,</i>					
<i>To Cash, paid duty on 42000 lb. of B. Lincoln's tobacco, sold for home consumption, at 4¾d.</i>			L.824	6	6
<i>To B. Lincoln his Accompt tobacco, abated for prompt payment</i>			117	15	2
				942	1 8
<i>Customhouse Bonds Dr. to B. Lincoln his Accompt tobacco, retired my bond of L.2826 : 5s. the remainder being discharged by the cargoes exported to Amsterdam and Bourdeaux</i>					
				1884	3 4
<i>Cash Dr. to B. Lincoln his Accompt tobacco, received back the old subsidy on 84000 lb. exported to Amsterdam and Bourdeaux</i>					
				262	10 -

London, 28 FEBRUARY 1772.

<i>Sundries Drs. to Cash,</i>		
<i>J. Vernon</i> , paid his bill on me to E. Bruce,		
25 ult. 1 mdt.	-	L.150 — —
<i>J. Ritchie</i> , paid his bill on me to J. Winter,		
26 ult 30 ddt.	-	175 — —
<i>J. Hartley</i> , paid his bill to J. Hill, 25 ult		
1 mdt.	-	L.200 — —
and to J. Turner 3 ddt.	150	— —
	350	— —

675 — —

London, 1 MARCH 1772.

<i>B. Lincoln his Accompt Tobacco Dr. to Sundries,</i>		
<i>To Charges Merchandize</i> , for cellar-rent and incidents,	-	L.6 10 —
<i>To Insurance of Debts</i> , for insurance of L.2176, at $1\frac{1}{4}$ per cent.	-	27 4 —
<i>To Commission accompt</i> , for commission on 150 hds. at 7s. 6d.	-	56 5 —
<i>To Interest-accompt</i> , for interest on J. Garner's bill, L.1356 : 5s. for 6 months	-	33 18 —
<i>To B. Lincoln his Accompt-current</i> , for nett proceeds	-	924 15 3

1048 12 3

2.		
<i>A. and T. Hopp</i> , my accompt <i>Dr. to Cash</i> , paid their bill to J. Vervins, 24 ult. ft. being value of f.9135 : 18 banco, agio 3 per cent. f.9410 — cur. in full of the balance due them, ex. 35s. 3d.	-	-

863 18 3

<i>Profit and Loss Dr. to A. and T. Hopp</i> , my Accompt, for loss by exchange	-	-
---	---	---

2 8 9

4.		
<i>B. Lincoln, his Accompt-current Dr. to Sundries,</i>		
<i>To Ja. Vernon</i> , for a cargo shipped by him, per the Nancy, Dudingstone, from Bristol to Virginia, for accompt of do. Lincoln, amo. per inv. L.630 — —		
and $\frac{1}{2}$ com. on do. at 2 percent.	6 6	—

L.636 6 —

<i>To Commission-accompt</i> , for my $\frac{1}{2}$ com. on do.	6 6	—
---	-----	---

642 12 —

6.		
<i>Cyder Dr. to Bills payable</i> , bought from J. Harman, per bill 6 mdt. 200 casks, at 7s. 6d.	-	-

75 — —

London, 6 MARCH 1772.

<i>Cyder Dr. to Sundries</i> , for 300 casks, bought from J. Danby, at 8s. L.120.		
<i>To Barley</i> , delivered in barter 50 qrs. at 25s. L.62 10 —		
<i>To Cash</i> , paid balance	57 10 —	
	120 — —	
8.		
<i>J. Vernon, Dr. to A. and T. Hopp</i> , my <i>Accompt</i> , for my bill on them to him, 10 dft. f.2000 current, at 22½ d.	187 10 —	
10.		
<i>Ship Liberty</i> , and <i>Voyage from New York</i> , <i>Dr. to J. Dickens</i> , New York, for said ship, W. Hooper master, purchased by him, on my <i>accompt</i> , burden 200 tons, at L.3 : 10s. per ton L.700 — —		
and a cargo lumber for Barbadoes, consigned to D. Mason, amount, with charges,	650 — —	
Ex. 160 per cent. Currency L.1350 — —	843 15 —	
<i>Cash Dr. to Alum</i> , for 10 C. at 17s. 11d.	8 19 2	
11.		
<i>Cash Dr. to Pierre Dupont</i> , for my bill on him to C. D'Eon, ufa. Lrs.7966 : 10, ex. 30½ d.	337 9 4	
<i>Profit and Loss Dr. to Pierre Dupont</i> , lost by exchange on his <i>accompt</i>	1 1 11	
14.		
<i>Barley Dr. to Sundries</i> ,		
<i>To Bills Payable</i> , for 400 qrs. from J. Ellis, per bill 3 mdt. at 24s. L.480 — —		
<i>To Cash</i> , for 300 at 23s. 9d. 356 5 —	836 5 —	
	700	
16.		
<i>Spanish Salt Dr. to Bills Payable</i> , bought from J. Lardbroke, per bill 3 mdt. 1000 bushels, at 1s. 5d.	70 16 8	
18.		
<i>Cash Dr. to Bills Receivable</i> , received payment of G. Byron's bill on J. Hill, 15 Dec. 3 mdt.	585 — —	
20.		
<i>A. and T. Hopp</i> , my <i>Accompt Dr. to J. Barneveldt</i> , for what he has paid them on my <i>accompt</i> , being value of the cargo tobacco, ex. 35s. 4d. f.4504 : 4 banco, agio 3½ per cent. f.4650 : 11 current	424 18 6	
<i>Sundries Drs. to Cash</i> ,		
<i>Ja. Ritchie</i> , paid his bill to J. Darling, 17 ult. 1 mdt. L.85 — —		
<i>B. Lincoln</i> , his <i>Accompt-current</i> , paid his bill to J. Stone, 30 dft.	300 — —	
3 B	385 — —	

London, 21 MARCH 1772.

<i>Adventure to Newfoundland Fishery Dr. to Sundries</i> , fitted out, for said fishery, the <i>Grampus</i> , Geo. Hardie master.				
<i>To Spanish Salt</i> , for 500 bushels, at 1s. 5d.	L. 35	8	4	
<i>To Bills Payable</i> , for bill to J. Cooper, 4 mdt. being value of casks,		56	16	8
				92 5 —
<i>Geo. Hardie, master of the Grampus, Dr. to Cash</i> , Advanced him				63 — —
<i>Cash Dr. to Sundries</i> ,				
<i>To Cyder</i> , for 100 casks to W. Blackney, at 8s.	L. 40	—	—	
<i>To Barley</i> , for 100 qrs. to ditto, 24s. 6d.	122	10	—	162 10 —
<i>Bills Receivable Dr. to Cash</i> , for my bill on W. Blackney, 3 mdt. in part of above				100 — —
— 23. —				
<i>J. Barneveldt Dr. to Sundries</i> ,				
<i>To Barley</i> , for 800 qrs. shipped on his accompt, per the <i>Diana</i> , Fenwick, at 22s. 6d.	L. 900	—	—	
<i>To Cash</i> , paid charges shipping		8	12	908 12 —
— 25. —				
<i>Goods Receivable Dr. to Thomas Smith, Newcastle</i> , contracted for 10 tons alum, to be delivered on or before 1 June, at 16s. per cwt.				160 — —
— 27. —				
<i>Cash Dr. to Barley</i> , received debenture for bounty on 800 qrs. exported to Amsterdam, at 2s. 6d.		L. 100	—	
and sold the same at 5 per cent. discount				95 — —
— 28. —				
<i>Ja. Ritchie Dr. to Cash</i> , paid J. Steinhoff of Gottenburgh's bill on me on his accompt, 25 Jan. 2 ufa.				76 12 —
— 29. —				
<i>Sundries Drs. to Spanish Salt</i> , for 500 bushels sold to Ja. Pemble, at 1s. 5½d.		L. 36	9	2
<i>Cash</i> , received in part		L. 16	9	2
<i>Bills Receivable</i> , for his bill on W. Croffie, 2 mdt.		20	—	36 9 2
— 31. —				
<i>Sundries Drs. to Cash</i> ,				
<i>Charges Merchandize</i> , paid small charges for 3 months		L. 12	7	6
<i>Proper Expences</i> , paid my own expences, 3 months		70	—	82 7 6

London, 1 APRIL 1772.

Voyage to Barbadoes, per the Swift, Turner, Dr. to Sundries, for a cargo consigned to David Mafon,

To Linen, for 30 ps. qt. 759 yds. at 1s. 3d. L. 46 17 6

To Muslins, for 20 ps. qt. 400 yds. at 5s. 100 — —

To J. Hartley, for paper, viz.

80 r. foolscap, at 13s. L. 52 — —

40 r. demy, at 22s. — 44 — —

6 months credit — — — 96 — —

To Bills Payable, for the following, from J.

Hammerman, per bill 9 mdt.

1526 lb. wrought iron, at 6½d. L. 41 6 7

728 lb. wrought copper, at 1s. 4d. 48 10 8

L. 89 17 3

and 1 box jewellery from J. Stand-

art, per bill 6 mdt. — 85 — —

174 17 3

To Cash, for 20 ps. 400 yds.

muslin, at 6s. — L. 120 — —

Charges at shipping — 2 10 —

122 10 —

2.

540 4 9

Cash Dr. to J. Hartley, received to accompt

200 — —

3.

Cash Dr. to J. Ritchie, received for the following bills,

J. Hog, on Penant and Johnson, 1 ult.

30 ddt. — L. 268 12 —

Do. Ritchie on Warren and Co. ft. 135 15 —

404 7 —

Tho. Smith, Dr. to Cash, paid him in part

60 — —

3.

J. Dickenson Dr. to Sundries, for linens shipped on his accompt per the Polly, Beatson,

To Linen, for 20 ps. 500 yds. at 1s. 4d. L. 33 6 8

To Bills pay. 40 1000 from J. Wren, per

bill 3 mdt. at 1s. 3d. 83 6 8

To Cash, 30 750 at 1s. 6d. L. 56 5 —

90 2250

and charges — 1 3 8

57 8 8

ex. 160 per cent. L. 278 : 11 : 2 currency.

174 2 —

3 B 2

London, 3 APRIL 1772.

<i>Sundries Drs. to Spanish Wool,</i>					
Cash, for	25 B. 4750 lb. at 2s. 5d.	L. 573	19	2	
J. Hartley	5 950 at 2s. 5 $\frac{1}{2}$ d. 3 m. cr.	115	15	7	
Bills rec.	3 570 at 2s. 5 $\frac{1}{2}$ d. to J. Webb,				
	per bill 3 mdt.	70	13	1	
	33 6270				760 7 10
<i>5.</i>					
<i>H. Valville, Bourdeaux, his Accompt Claret Dr. to Cash,</i>					
Pd. duty on 15 tons, at L. 66 : 0 : 5 $\frac{1}{2}$ ² / ₁₀ perton			L. 990	7	5
Freight of 30 pipes, at 35s.			52	10	—
Charges at landing			2	12	7
					1045 10 —
Having received 30 pipes, per the Bienfaisant, Reaumeur, to sell on his accompt.					
<i>6.</i>					
<i>Sundries Drs. to J. Hartley,</i>					
Barley, for 200 qrs. at 24s. 3d. 4 m. cr.			L. 242	10	—
Port-wine, for 20 pipes, at L. 32 : 12s. do.			652	—	—
					894 10 —
<i>10.</i>					
<i>J. Almond, Vintner Bishopgate-street, Dr. to Sundries,</i>					
To Port-wine, for 5 pipes, at L. 34 : 13s.			L. 173	5	—
To H. Valville, his Accompt Claret, for 5 pipes, at L. 58 : 10s.			292	10	—
To Cyder, for 15 casks, at 8s.			6	—	—
					474 15 —
<i>12.</i>					
<i>Voyage from Bristol to Barbadoes, per the Mermaid, Jackson, Dr. to Ja. Vernon, for 300 dozen bottled beer, shipped by him on my accompt, consigned to D. Mason, at 5s. 4d.</i>			L. 80	—	—
Charges shipping and casks			5	—	—
His commission on L. 85, at 2 $\frac{1}{2}$ per cent.			2	2	6
					87 2 6
<i>15.</i>					
<i>Debentures Dr. to Sundries, for a debenture received from J. Vernon, for a drawback on 100 C. glafs, at 2s. 4d.</i>					
L. 11 : 13 : 4, valued at 5 per cent. discount.			L. 11	1	8
To Voyage to Barbadoes, per the Mermaid, for $\frac{1}{3}$ of above, being for the bottles sent D. Mason,			L. 3	13	11
To Ja. Vernon, for the remaining $\frac{2}{3}$ belonging to him			7	7	9
					11 1 8

London, 18 APRIL 1772.

<i>Cash Dr. to Sundries,</i>					
<i>To Cyder, for 50 casks at 8s. 2d.</i>	-	L. 20	8	4	
<i>To Linen, for 50 ps. at 1250 yds. at 1s. 4d.</i>		83	6	8	
<i>To Hen. Valville, his Accompt Claret, for 5 pipes, at L. 58</i>	-	290	-	-	
					393 15 -
19.					
<i>Bills payable Dr. to Cash, paid bill to J. Priestly, 16 Oct. 6 mdt.</i>	-				270 - -
22.					
<i>James Farmer, Kingston, my Accompt of Corn Dr. to ditto my Accompt current, for the following, purchased by him on my accompt,</i>					
200 qrs. wheat, at 44s.	L. 440	-	-		
150 ditto 42s.	315	-	-		
		L. 755	-	-	
350					
312 qrs. barley 24s. 6d.	L. 382	4	-		
217 ditto 23s. 9d.	257	13	9		
		639	17	9	
329					1394 17 9
<i>Port-wine Dr. to Cash, paid for charges and corks at bottling 2 pipes into 112 dozen 3 bottles</i>					
					12 3 9
25.					
<i>James Farmer, my Accompt current Dr. to Sundries,</i>					
<i>To J. Hartley, for his bill on him, 20 cur. 1 mdt.</i>	-	L. 200	-	-	
<i>To J. Almond, for his bill on him, 21 cur. 2 mdt.</i>	-	271	15	-	
					471 15 -
28.					
<i>Ja. Vernon Dr. to J. Almond, received ditto Almond's bill 4 mdt. for the balance of his accompt, and delivered the same to W. Harris, on accompt of ditto Vernon</i>					
					200 - -

London, 1 MAY 1772.

<i>J. Velasquez, Madeira, my Accompt of Goods Dr. to Voyage to Madeira, for the cargo per the Mercury, Hanway, received by him, value including insurance</i>					
		395	4	6	
<i>Voyage from Madeira to Barbadoes, per the Mercury, Hanway, Dr. to J. Velasquez, Madeira, my accompt current, for a cargo wine shipped by him on my accompt, consigned to D. Mason, amount, per invoice, 1960 milrees, at 5s. 6½ d.</i>					
		543	1	8	

London, 4 MAY 1772.

<i>Cash Dr. to H. Valville his Accompt Claret,</i>					
for 2 pipes, at	-	L. 58 : 5s.	L. 116	10	-
8 ditto	-	57 : 10s.	460	-	-
				576	10
10					
6.					
<i>Voyage to Constantinople, per the Fortunate, Allan, Dr. to Sundries, for a cargo consigned him,</i>					
<i>To Bills Payable,</i>					
for 100 yds. cloth, at 17s.		L. 85	-	-	
22 yds. ditto, 12s. 6d.		13	15	-	
			L. 98	15	-
bought from J. Clive, per bill 9 mdt.					
<i>To T. Smith, for 12 foddors</i>					
lead, at L. 12 : 16s	-		153	12	-
<i>To Cash, for 12 boxes hard-ware,</i>					
		L. 180	-	-	
and charges at shipping		3	12	6	
			183	12	6
<i>To J. Hazard, for insurance on L. 450, at 4½</i>					
gs. per cent. with half policy, 3s. 9d.			21	9	-
				457	8
					6
J. Udney, Constantinople, his Accompt Dr. to Sundries,					
<i>To Bills payable, for 20 hds. fugar, qt. each 12 C. is 240 C.</i>					
bought from S. Hodgson, per bill 4 mdt. at 48s. per C.					
			L. 576	-	-
<i>To Cash, paid charges at shipping</i>					
			1	10	-
<i>To Commission-accompt, for commission on</i>					
L. 577 : 10s. at 2½ per cent.	-		14	8	9
<i>To J. Hazard for insurance of L. 600, at</i>					
4½ gs. with half policy, 3s. 9d.	-		28	10	9
				620	9
					6
Shipped on his accompt, per the Fortunate, Allan.					
8.					
<i>Voyage from Newcastle to the Baltic, per the Isis, Willis, Dr. to Thomas Smith, for 50 Ch. coals shipped by him on my accompt, amount per invoice, including duty</i>					
				78	-
10.					
<i>J. Farmer, my Accompt-current, Dr. to Cash, paid his bill to J. Richards, 27 April 10 ddt.</i>					
				400	-
12.					
<i>Alum Dr. to Goods Receivable, received 10 tons from T. Smith, per agreement, 25 March, at L. 16</i>					
				160	-
<i>Cash Dr. to House in Fleetstreet, received a half year's rent</i>					
				40	-

London, 18 MAY 1772.

Cash Dr. to Sundries,
To Bills Receivable, for J. Rossiter, on W. Pemble, 15
 Nov. 6 mdt. - L. 160 — —
To J. Barneveldt, received from J. Hill, on
 his accompt - 500 — —

660 — —

Sundries Drs. to Cash,
J. Ritchie, paid his bill to A. Murdoch, 15 ult. 1 mdt.
 L. 300 — —
T. Smith, paid his bill to J. Perryman, ft. 100 — —
J. Farmer, my accompt-current, paid his bill
to B. Allan, 3 ddt. - 200 — —

600 — —

— 20. —

Voyage from Kingston to Amsterdam, per the Generous, Dod-
son, Dr. to Sundries,
To J. Farmer, my Accompt Corn, for
 350 qrs. wheat, at 44s. - L. 770 — —
 212 qrs. barley, 24s. 6d. - 259 14 —

562

L. 1029 14 —

To J. Farmer, my Accompt-current,
 for com. on 562 qrs. at 6d. L. 14 1 —
 and charges - 3 8 —

17 9 —

1047

3 —

Shipped by him on my accompt, consigned to J. Barneveldt.

— 22. —

Sundries Drs. to Port-wine,
J. Hazard for 12 doz. at 16s. - L. 9 12 —
J. Almond 45 15s. 6d. 34 17 6
Cash 20 do. - 15 10 —
Proper expences 10 do. - 7 15 —

87

67

14

6

Barley Dr. to Sundries,

To J. Farmer, my Accompt Corn, for 317 qrs. being the
 remainder of what he purchased, received per the In-
 dultry, Thomson, L. 365 3 9
To J. Farmer, my Accompt current, for com-
 mission, at 6d. per qr. L. 7 18 6
 and charges - 2 16 9

10 15 3

375

19 —

London, 25 MAY 1772.

Debentures Dr. to Voyage from Kingston to Amsterdam.

Received a debenture for bounty on

350 qrs. wheat, at 5s.	-	L. 87 10 —
212 barley	2s. 6d.	26 10 —
		L. 114 — —

Which I value at 5 per cent. discount

108 6 —

Cash Dr. to Sundries,

To <i>Muslins</i> , for 10 ps. qt. 200 yards, at 5s. 6d.	-	55 — —
To <i>Cyder</i> , for 50 casks, at 8s. 6d.	-	21 5 —
To <i>Port-wine</i> , for 2 pipes, at L. 35	-	70 — —
To <i>H. Valville his Accompt Claret</i> , for 3 pipes, at L. 58 : 5s.	-	174 15 —

321 — —

Ja. Hartley Dr. to Cash, paid him

-

300 — —

31. —

John Hazard Dr. to Insurance-accompt, underwrote at his office, for

L. 70 per the Norfolk, Home, from London to Grenada, at 5 gs. per cent.	-	L. 3 13 6
50 per the Dispatch, Pritchard, from London to Petersburg, at 2½ gs.	-	1 6 3

4 19 9

London, 1 JUNE 1772.

Cash Dr. to Bills receivable, received payment of J. Pemble, on W. Crobie, 29 March, 2 mdt.

20 — —

3. —

Cash Dr. to A. and T. Hopp, received payment of their bill on H. Van Sittart, 16 March, 2½ ufa. being value of f. 2650 : 11 current, agio 3¼ per cent. is f. 2567 : 2 banco, ex. 35s. 4½ d.

241 17 11

5. —

Bills of Exchange Dr. to Cash, bought the following,

H. Johnson on W. Le Maitre, Paris, 60 ddt.

Lrs. 2000, ex. 29½

L. 81 18 10

J. Crobie, on N. Ruiter, Amsterdam, ufa.

f. 1000 banco, at 22d.

91 13 4

B. Baker, on A. Pinto, Lisbon, ufa. milrees,

1000, at 5s. 7d.

279 3 4

452 15 6

7. —

J. Hartley Dr. to H. Valville his Accompt Claret, sold him 3 pipes, at L. 57 : 10s. 6 months credit

172 10 —

London, 8 JUNE 1772.

<i>Bills Receivable Dr. to George Hay, Dantzick, my accompt,</i> for his bill on R. Ellis, being value of a cargo timber furnished him in consequence of a credit from me, 1 May, 2 mdt. f. 3750 Polish, at 18.			187	10	—
<i>George Hay Dr. to A. and T. Hopp, for his bill on them,</i> 1 May, ufa. f. 1985 : 6 banco, being value of f. 3750 Po- lish, ex. 340, agio 3, f. 2044 : 17 current, at 21½ d.			185	6	3
12.—					
<i>Cash Dr. to Sundries,</i> <i>To Debentures, sold my glass debenture,</i> L. 11 : 13 : 4, for — L. 11 — —					
<i>To Bills of Exchange, for B. Baker on A.</i> Pinto, milrees 1000, at 5s. 7½ d. — 281 5 —			292	5	—
14.—					
<i>Cash Dr. to Ja. Ritchie, received from J. Harris on his ac.</i>			300	—	—
17.—					
<i>Bills payable Dr. to Cash, paid bill to J. Ellis, 14 March,</i> 3 mdt. — —			480	—	—
<i>J. Vernon Dr. to Bills of Exchange, for J. Crosbie on N.</i> Ruiter, f. 1000 banco, at 22½ d. — —			92	—	3
18.—					
<i>C. Meldrup, Copenhagen, my Accompt-current Dr. to Voyage</i> <i>from Newcastle to the Baltic, for nett proceeds of the</i> cargo per the Isis, Willis, per accompt sales, R. D. 336, at 4s. 3d. — —			71	8	—
19.—					
<i>D. Mason, Barbadoes, my Accompt Goods Dr. to Sundries,</i> <i>To Voyage from Cork to Barbadoes, for the</i> cargo per the Dolphin, received by him, value, including insurance, — L. 615 15 —					
<i>To D. Mason, my Accompt-current, for freight</i> and charges paid by him, L. 65 currency, ex. 150 per cent. — 43 6 8			659	1	8
<i>Sundries Drs. to Ship Liberty, &c. for the cargo lumber</i> received and disposed on by D. Mason.					
Currency. Sterling.					
<i>D. Mason, my Accompt current,</i> for part sold for ready money L. 432 — — L. 288 — —					
<i>Ditto my Accompt Debts,</i> for part sold on credit — 210 — — 140 — —					
<i>Providence Plantation,</i> for part used there — 120 — — 80 — —					
Ex. 150 per cent. L. 762 — —			508	—	—
3 C					

London, 19 JUNE 1772.

<i>Sundries Drs. to D. Mason, my Accompt-current,</i>		
<i>Ship Liberty, &c. for charges</i>	<i>Currency. Sterling.</i>	
paid by him	L. 6 9 —	L. 4 6 —
<i>W. Hooper master of the Liberty,</i>		
advanced him	50 — —	33 6 8
	L. 56 9 —	

37 12 8

Voyage from Barbadoes, per the Liberty, Hooper, Dr. to Providence Plantation, for 30 hds. sugar shipped by D. Mason, qt. each 12 C. is 360 C. at L. 2

720 — —

J. Dickenson Dr. to Sundries, for rum per the Thetis, Penant.

To Providence Plantation,

for 10 puncheons, the produce of my own plantation, *Currency. Sterling.*
qt. 800 gallons, at 3s. 4½d. L. 135 — — L. 90 — —

To D. Mason, my Ac. current,
for 30 puncheons bought by him, qt. 2400 gallons, at 3s. 4½d.

405 — — 270 — —

L. 540 — —

360 — —

Ex. from Britain to New York, 160, is L. 576 currency of New York.

Sundries Drs. to J. Hazard,
Ship Liberty, &c. for insurance of L. 400 on said ship, W. Hooper, master, from Barbadoes to London, at 4 gs. with half policy, L. 16 19 9
Voyage from Barbadoes, for insurance of L. 750, value, in sugar, per above ship, with half policy

31 13 9

48 13 6

Bills payable Dr. to Cash, paid bill to J. Lardbroke, 16 March, 3 mdt.

70 16 8

20 — —

A. and T. Hopp Dr. to J. Barneveldt, for what he has paid them on my accompt, f. 4433 : 6 current, ex. 36s. 2d.

408 12 —

A. and T. Hopp Dr. to Chr. Meldrup, for what he has remitted them on my accompt, f. 777 : 15 current, being value of R. D. 336 Danish, ex. with Denmark 8 per cent. and with London 36s. 2d.

71 13 7

London, 20 JUNE 1772.

<i>Cash Dr. to A. and T. Hopp, for their bill on E. Wilmot,</i> 14 current, 2 ufa. L. 288 : 12 : 2, discounted at the Bank of England, being value of $\text{£} 3066 : 10 \text{ banco, ex.}$ 35s. 5d. agio $3\frac{1}{4}$, $\text{£} 3166 : 4 \text{ current.}$ The interest is L. 2 : 5 : 9, and the sum received			286	6	5
24.---					
<i>Cash Dr. to Bills Receivable, for bill on W. Blackney, 21</i> March, 3 mdt.			100	—	—
26.---					
<i>Sundries Drs. to Philip Darceville, Paris, Exchange Account,</i> <i>Cash, for my bill on him</i> Livres. Ex. Sterling. to W. Hill, 30 ddt. 3200 — 30 d. L. 133 6 8 <i>Ja. Vernon, for do. to him</i> 30 ddt. — 1800 — 75 — —			208	6	8
5000 —					
29.---					
<i>Claret Dr. to H. Valville his Account Claret, taken on my</i> own account the remaining 4 pipes, at L. 57 : 10s.			230	—	—
<i>H. Valville his Account of Claret Dr. to Sundries,</i> <i>To Charges Merchandize,</i> for charges during sale L. — 9 7 and cellar-rent of 30 pipes at 2s. 6d. — 3 15 —					
L. 4 4 7					
<i>To Commission-account, for commission on</i> L. 1736 : 5s. at 2 per cent. — 34 14 6					
<i>To H. Valville, his account current, for nett</i> proceeds — — 651 15 11			690	15	—
<i>H. Valville his Account current Dr. to Bills of Exchange,</i> for H. Johnson, on W. Le Maitre, 5 cur. 60 ddt, re- mitted him Lrs. 2000, ex. $29\frac{1}{2}$ d. —			82	12	9
<i>J. Dickenson Dr. to Cash, paid his bill on me to D. De</i> Berdt, 60 ddt. ex. 160, L. 400 currency —			250	—	—
30.---					
<i>J. Hazard Dr. to Insurance-account, for amount of pre-</i> miums on fundry policies, underwritten this month at his office, per Insurance-book —			8	18	6
<i>Sundries Drs. to Cash,</i> <i>Charges Merchandize, paid small charges for</i> 3 months — — L. 5 3 4					
<i>Proper Expenses, paid my own expences for do.</i> 90 — —			95	3	4
3 C 2					

London, 1 JULY 1772.

<i>Cash Dr. to Sundries,</i>				
<i>To Barley, for 350 qrs. at 25s.</i>	-	L. 437	10	-
<i>To Alum, for 130 cwt. at 15s.</i>	-	97	10	-
<i>To Claret, for 1 pipe</i>	-	58	-	-
				593 — —
<i>Bills payable Dr. to Cash, paid bill to E. Wynne, 28 Sep.</i>				
9 mdt.	-			500 — —
				3.
<i>J. Beaumont, Esq; of Hartfield, Dr. to Frederick Brago,</i>				
<i>Lisbon, my accompt, for what he has paid him in conse-</i>				
<i>quence of a credit from me, per receipt transmitted, mil-</i>				
<i>rees 1000, ex. 5s. 7½ d.</i>				281 5 —
<i>P. Darceville, Exchange accompt, Dr. to Cash, for M. Lon-</i>				
<i>gueville's bill on R. Barbour, 30 ddt. remitted him,</i>				
<i>Lrs. 4000, ex. 29½ d.</i>				163 17 9
				4.
<i>Cash Dr. to Bills Receivable, for G. Hay's bill on R. Ellis,</i>				
<i>1 May, 2 mdt. f. 3750 Polish, at 1s.</i>				187 10 —
				6.
<i>Cash Dr. to House in Fleetstreet, received from the Sunfire</i>				
<i>office, the value insured thereon, the house having been</i>				
<i>burnt 8 ult.</i>				500 — —
<i>Goods Receivable Dr. to Arthur Young of Fairfield, Kent,</i>				
<i>contracted for 2 tons hops of the present year's growth,</i>				
<i>to be delivered me on or before 30 November, at L. 6 : 5s.</i>				
<i>per cwt.</i>				250 — —
<i>Bills payable Dr. to Cash, paid bill to J. Wren, 3 April,</i>				
<i>3 mdt.</i>				83 6 8
				8.
<i>Cash Dr. to House in Fleetstreet, fold the area on which</i>				
<i>it stood for</i>				200 — —
<i>Sundries Drs. to Cash,</i>				
<i>Ja. Ritchie, paid his bill to J. Lawfon, 6 May,</i>				
<i>60 ddt.</i>		L. 290	-	-
<i>J. Farmer, paid his bill to J. Husband, 5 May,</i>				
<i>2 mdt. being in full of the bal. due him</i>		351	7	-
<i>A. Young, paid his bill to A. Dobson, ft.</i>		100	-	-
				741 7 —
				12.
<i>Bills Payable Dr. to Cash, paid bill to J. Wilcoat, 10 Jan.</i>				
<i>6 mdt.</i>				156 5 —

London, 12 JULY 1772.

<i>Goods from Gottenburgh Dr. to Sundries,</i>					
<i>To P. Moss, Gottenburgh, my accompt, for a cargo iron</i>					
<i>and deals, per the Isis, Willis, amount, per invoice,</i>					
<i>copper dollars 17556, exchange 42</i>	L. 418	—	—		
<i>To Cash, paid freight of 90 tons, at 25s.</i>					
	L. 112	10	—		
<i>duty on 20 tons iron, at</i>					
<i>L. 2 : 8 : 6</i>	48	10	—		
<i>36 C. deals, at</i>					
<i>L. 1 : 8 : 7½</i>	51	10	6		
<i>charges at unlading</i>	1	1	6		
			213	12	—
-----16-----					
<i>Cash Dr. to Sundries,</i>					
<i>To Goods from Gottenburgh,</i>					
<i>for 12 C. deals, at L. 6 : 12s.</i>	L. 79	4	—		
<i>5 tons iron, at L. 18 : 10s.</i>	92	10	—		
	L. 171	14	—		
<i>To Port-wine, for 5 pipes, at L. 34</i>	170	—	—		
				341	14
-----18-----					
<i>Sugar Dr. to Sundries,</i>					
<i>To Voyage from Barbadoes, per the Liberty, for 30 hds. su-</i>					
<i>gar, value including insurance</i>	L. 751	13	9		
<i>To Cash, paid duty on 360 C.</i>					
<i>at 4s. 9½d.</i>	L. 86	17	—		
<i>charges at unlading</i>	1	3	6		
			88	—	6
				832	14 3
-----24-----					
<i>J. Fullerton Barbadoes, his Accompt Sugar, Dr. to Cash,</i>					
<i>paid duty on 70 hds. consigned me, per the Liberty,</i>					
<i>840 C. at 4s. 9½d.</i>	L. 202	13	—		
<i>charges at unlading</i>	2	14	10		
				205	7 10
-----24-----					
<i>Cash Dr. to J. Beaumont, received from W. Manly, on</i>					
<i>his accompt</i>					
				300	—
-----24-----					
<i>Bills Receivable Dr. to Goods from Gottenburgh, sold A.</i>					
<i>Merrick, per bill 6 mdt. 12 C. deals, at L. 6 : 10s.</i>					
				78	—
-----24-----					
<i>Sundries Drs. to Ship Liberty, &c.</i>					
<i>Sugar, for freight of 30 hds. at 25s.</i>	L. 37	10	—		
<i>J. Fullerton, his Accompt Sugar,</i>					
<i>for freight of 70 hds. at 25s.</i>	87	10	—		
				125	—

London, 24 JULY 1772.

<i>William Hooper Dr. to Ship Liberty, &c. for freight of 150 hds. sugar, received by him, at 25s.</i>	187	10	—
<i>Ship Liberty, &c. Dr. to William Hooper, for charges thereon since purchased, including his own wages</i>	215	—	—
<i>Cash Dr. to Sugar, for 15 hds. qt. 180 cwt. at L.2 : 8s.</i>	432	—	—
<i>Sundries Drs. to Cash,</i>			
<i>Hen. Valville, his Accompt. current, paid his bill to A. Hill,</i>			
11 current, 10 ddt. L.569 3 2			
<i>Bills Payable, paid bill to J. Cooper, 21 March,</i>			
4 mdt. 56 16 8	625	19	10
30.			
<i>P. Darceville. Exchange Accompt, Dr. to J. Hartley, for ditto Hartley's bill on W. Le Maitre, Paris, 60 ddt.</i>			
Lrs. 1500 remitted ditto Darceville, ex. 29d.	60	8	4
London, 1 AUGUST 1772.			
<i>Bills Receivable Dr. to Ja. Ritchie, for his bill on J. Benson, 29 June 30 ddt.</i>	350	—	—
<i>Ja. Ritchie, Dr. to Sundries,</i>			
<i>To Bills Receivable, for above bill, returned with protest</i>	L.350	—	—
<i>To Cash, for charge of protest</i>	—	6	9
3.	350	6	9
<i>J. Barneveltdt, my Accompt of Debts, Dr. to Voyage to Amsterdam, for the cargo per the Generous, Dodson, sold by him on credit, nett proceeds, per accompt sales, f.13462, ex. 36s. 1d.</i>	1243	12	—
<i>Goods Receivable Dr. to A. Young, contracted for 1000 qrs. barley, of this year's crop, to be delivered me on or before 1 February next, at 24s.</i>	1200	—	—
5.			
<i>J. Beaumont Dr. to J. Spendoza, Madrid, for what he has paid him in consequence of a credit from me, per receipt transmitted, 200 pistoles, is 6400 rials, ex. 3s. 7d.</i>	143	6	8
<i>J. Spendoza Dr. to F. Brago, for his bill on him on my accompt, usa. milrees 502 : 500, being value of rials 6432, ex. from Madrid to Lisbon 625, and from London to Lisbon 5s. 6½d.</i>	139	4	8
<i>J. Spendoza to be credited, inner column, for commission on R.6400, at ½ per cent. R. 32</i>			

London, 7 AUGUST 1772.

<i>Cash Dr. to Sundries,</i>					
<i>To Port-wine,</i>					
for 2 pipes, at L.33 : 10s.	L. 67	—	—		
12 dozen, at 15s. 4d.	9	4	—		
			L. 76	4	—
<i>To Alum, for 25 C. at 14s.</i>	—		17	10	—
<i>To Goods from Gottenburgh,</i>					
for 3 tons iron, at L.17 : 17s.	—		53	11	—
<i>To Sugar, for 5 hds. qt. 60 C. at L.2 : 7s.</i>			141	—	—
					288
	8				5
<i>D. Mason, my Accompt Goods, Dr. to Sundries,</i>					
<i>To Voyage to Barbadoes, per the Swift, Turner, for the</i>					
cargo received by him, value	—		L. 540	4	9
<i>To Voyage from Bristol to Barbadoes, for the</i>					
cargo per the Mermaid, Jackson,	—		83	8	7
					623
					13
					4
<i>Sundries Drs. to D. Mason, my Accompt Goods,</i>					
<i>D. Mason, my Acc. current, Currency. Sterling.</i>					
for ready money sales	L. 765	18	—	L. 510	12
<i>Ditto, my Accompt Debts,</i>					
for sales on credit	—	369	9	—	246
<i>Providence Plantation,</i>					
for goods used there	—	171	—	—	114
					870
					18
					—
ex. 150 per cent.	L. 1306	7	—		
<i>Sundries Drs. to Voyage from Madeira to Barbadoes,</i>					
<i>D. Mason, my Accompt-current,</i>					
for 10 pipes wine sold for	Currency.		Sterling.		
ready money, at L. 51 : 6s.	L. 513	—	—	L. 342	—
and 2 ditto damaged, at L. 27	54	—	—	36	—
	L. 567	—	—	L. 378	—
<i>Ditto, my Accompt Debts,</i>					
for 8 pipes sold on cr. at L. 53	424	—	—	282	13
					660
					13
					4
	L. 991	—	—		
<i>Sundries Drs. to D. Mason, my Accompt-current,</i>					
<i>D. Mason, my Accompt Goods, for freight and charges on</i>					
goods,			Currency.	Sterling.	
per the Swift Turner,	L. 80	9	6	L. 53	13
and per the Mermaid, Jackson,	18	7	6	12	5
Carried forward	L. 98	17	—	L. 65	18

London, 8 AUGUST 1772.

	Currency.	Sterling.			
Brought forward	L. 98 17 —	L. 65 18 —			
<i>Voyage from Madeira to Barba-</i> <i>does, for freight and charges</i> on wine	115 1 —	76 14 —	142	12	—
	213 18 —	ex. 150			
<i>Ben. Lincoln, his Accompt-current, Dr. to Providence planta-</i> <i>tion, for 15 C. cotton, shipped by D. Mason, at L. 8: 4s.</i> L. 123 currency, ex. 150.			82	—	—
11. —					
<i>Thomas Smith Dr. to Cash, paid his bill on me to Surtees</i> <i>and Burdon, 8 June, 2 mdt. in full of the balance due</i> <i>him</i>			231	12	—
15. —					
<i>Voyage to Hamburg per the Fair Trader, Warren, Dr. to</i> <i>Sundries,</i> To Barley, for 200 qrs. at 25s.	L. 250 — —				
To Bills payable, for 300 qrs. barley from W. Bakewell, per bill 2 mdt. at 25s.	375 — —				
To Sugar, for 10 hds. qt. 120 C. at 47s.	282 — —				
To Cash, paid charges at shipping	2 5 —		909	5	—
Configned to J. Thornton.					
17. —					
<i>Cash Dr. to J. Barneveltdt, my Accompt debts, for my bill on</i> <i>him to A. Hill, 2 ufa. f. 3000 current, ex. 35s. 6d.</i>			281	13	9
<i>Sundries Drs to J. Fullerton, his Accompt Sugar,</i> <i>Bills Receivable, fold J. Parker H. C.</i> per bill 4 mdt. at 47s. 6d.	12 144	L. 342 — —			
and W. Crosbie per bill 4 mdt. do.	20 240	570 — —			
		L. 912 — —			
J. Hartley, sold him 3 mo. cr. do.	5 60	142 10 —	1054	10	—
	37 444				
19. —					
F. Brago to be credited inner column commission on M. 1000 at $\frac{1}{2}$ per cent. M. 5					
<i>F. Brago Dr. to Cash, paid his bill on me to C. Marriot,</i> <i>16 June, 2 mdt. being value of M. 1005, ex. 5s. 6$\frac{1}{2}$ d.</i>			278	9	4
<i>Cash Dr. to P. Darceville, Exchange accompt, for my bills</i> <i>on him, viz.</i> Ex. to J. Sullivan, 30 ddt. Lrs. 2400, 30 d. L. 100 — — to S. Bambridge, 60 ddt. 5700, 29 $\frac{1}{2}$ 236 10 2			336	10	2
	Lrs. 8100				

London, 22 AUGUST 1772.

<i>Bills receivable Dr. to Sundries,</i>				
To Alum, for 10 C. at 14s.	-	L. 7	—	—
To J. Fullerton, his Account Sugar, for				
10 hds. qt. 120 C. at 47s. 3d.	-	283	10	—
To Cyder, for 100 casks, at 8s. 4d.	-	41	13	4
Sold I. Drayton per bill 6 mdt.				
		332	3	4
25.				
<i>Cash Dr. to Sundries,</i>				
To Claret, for 2 pipes, at L. 58	-	L. 116	—	—
To Cyder, for 100 casks, at 8s. 2d.	-	40	16	8
To Port-wine, for 2 pipes, at L. 34	-	68	—	—
		224	16	8
31.				
<i>Sundries Drs to Cash,</i>				
J. Ritchie, paid his bill to A. Stewart, 28				
July, 30 dd.	-	L. 178	—	—
Fitzherbert and O'Haro, paid their bill to				
L. O'Brien, 10 dft. being value of				
L. 312 : 7 : 4 Irish, ex. 9 per cent.		286	11	6
		464	11	6

London, 1 SEPTEMBER 1772.

<i>Adventure to Newfoundland fishery Dr. to Geo. Hardie, for</i>				
expences on the cargo completed 18 July, per advice				
from ditto Hardie, who was then ready to proceed to				
the Streights				
		78	—	—
<i>Geo. Hardie Dr. to J. Dickenson, for his bill on him on my</i>				
account, L. 100 currency, ex. 160				
		62	10	—
8.				
<i>Cash Dr. to Voyage to Hamburgh,</i>				
for drawback of duty on the sugar		L. 28	19	—
and bounty on 500 qrs. barley, at 2s 6d.		62	10	—
		91	9	—
<i>Cash Dr. to J. Beaumont, received from W. Manley on</i>				
his account				
		200	—	—
9.				
<i>Cash Dr. to P. Darceville, Exchange-account, for my bill on</i>				
him to J. Hart, 1 mdt. Lrs. 3600, ex. 29 $\frac{1}{2}$.				
		149	7	6
<i>Bills payable Dr. to Cash,</i>				
Paid bill to J. Harman, 6 March, 6 mdt.		L. 75	—	—
to S. Hodgson, 6 May, 4 mdt.		576	—	—
		651	—	—

London, 12 SEPTEMBER 1772.

S				
<i>Sundries Drs. to Share of Ship Diligence, settled with Ja. Byron, for my proportion of profits since 1 September 1771,</i>				
The amount of freights received is	L. 860 — —			
of charges	530 — —			
Whereof my $\frac{1}{3}$ share is L. 110	L. 330 — —			
Cash, received in part	L. 60 — —			
Bills Receivable, for J. Byron's bill, 3 mdt. for the balance	50 — —			
		110	—	—
15.				
<i>Cash Dr. to Sundries, To Goods from Gottenburgh, for 7 tons iron, at L. 18</i>		L. 126 — —		
12 C. deals, at 7s.		84 — —		
		L. 210 — —		
To Claret, for 1 pipe	57 — —			
		267	—	—
18.				
<i>Voyage from Liverpool to Venice, Dr. to Will Louthier, Liverpool. for a cargo salmon purchased by him on my accompt, and shipped per the Industry, Smith, consigned to F. Pizoni, viz.</i>				
400 barrels, at 45s.	L. 900 — —			
Charges,	5 5 —			
		905	5	—
25.				
<i>Cash Dr. to Bills receivable, for bill on H. Wren, 23 Jan. 8 mdt.</i>		89	3	4
<i>J. Beaumont Dr. to P. Pignatelli, Rome, for what he has paid him, per receipt transmitted me, 500 crowns, ex. 6s. 1d.</i>				
		152	1	8
<i>A. Young Dr. to Goods receivable, for the bargain hops, 6 July, retracted at his desire</i>				
		250	—	—
<i>Cash Dr. to Profit and Loss, received penalty from A. Young for agreeing to the above</i>				
		10	—	—
28				
<i>Cash Dr. to Ship Liberty, &c. sold said ship for</i>		420	—	—
<i>P. Darceville, Exchange-accompt, Dr. to Cash, paid his bill on me to J. Bougainville, 25 ult. ufa. Lrs. 6000, ex. 30d.</i>				
		250	—	—
30.				
<i>Sundries Drs. to Cash, Charges Merchandize, for 3 months charges</i>		L. 3 5 —		
<i>Proper Expences, for 3 months expences</i>		100 — —		
		103	5	—

London, 1 OCTOBER 1772.

<i>J. Velasquez, Madeira, my Accompt-current, Dr. to ditto my Accompt Goods, for nett proceeds of the cargo per the Mercury, Hanway, per accompt sales, milrees 1625, ex. 5s. 6½ d.</i>	450	5	2
<i>J. Velasquez, my Accompt current, Dr. to F. Brago, for his bill on him on my accompt, ufa. milrees 335, ex. 5s. 6½ d.</i>	92	16	6
<i>Bills payable Dr. to Cash, paid bill to J. Standart, 1 April, 6 mdt.</i>	85	—	—
<i>Voyage to Lisbon in Co. with A. Benson and H. Primrose, Dr. to Sundries, for a cargo shipped on our joint accompt, each one-third concerned, per the True Briton, Fisher, consigned to F. Brago,</i>			
<i>To Barley, for 100 qrs. at 24s. 6d.</i>	L. 122	10	—
<i>To A. Benson, his Accompt-proper, for cloth furnished by him,</i>	300	—	—
<i>To Bills payable, for hardware bought from J. Hawkins, per bill 3 mdt.</i>	136	—	—
<i>To Cash, for shoes from N. Pemberton,</i>	L. 75	—	—
<i>And charges</i>	3	4	—
	78	4	—
	636	14	—
<i>A. Benson, Lombardstreet, his Accompt-proper, Dr. to ditto his Accompt in Co. for his ⅓ of above</i>	212	4	8
<i>H. Primrose, Leadenhall-street, his Accompt-proper, Dr. to ditto his Accompt in Co. for ditto.</i>	212	4	8
<i>Bills Receivable Dr. to Sundries,</i>			
<i>To Cyder, for 83 casks, at 8s.</i>	L. 33	4	—
<i>To J. Fullerton, his Accompt Sugar, for 10 hds. qt. 120 C. at 47s.</i>	282	—	—
<i>Sold J. Garner, per bill 2 mdt.</i>	315	4	—
<i>Proper Expences Dr. to Cyder, for 1 cask</i>	—	8	—
<i>The remaining cask is damaged, and quite usefess.</i>			
<i>Sundries Drs. to Voyage to Hamburgh, for nett proceeds of the cargo per the Fair Trader, Warren, per accompt sales, M. 13460 lubs, at 16½ d.</i>			
<i>J. Thornton, my Accompt-current, for one-half sold for ready money M. 6730</i>	L. 462	13	9
<i>Ditto, my Accompt debts, for one-half sold on credit</i>	6730	462	13 9
		925	7 6
	M. 13460		

London, 9 OCTOBER 1772.

<i>Peder Moss Dr. to J. Thornton, my Accompt-current, for ditto Moss's bill on him on my accompt, 18 July, 2 mdt, M. 5976 : 8 lubs, at 16½ d. being value of copper dollars 17566, ex. 11¼</i>		410	17	8
12. —				
<i>Cash Dr. to Sundries,</i>				
<i>To Voyage from Liverpool to Venice,</i>				
for bounty on 400 barrels salmon. at 4s. 6d. L. 90 —				
<i>To Voyage to Lisbon in Co. for bounty on 100 qrs. barley, at 2s. 6d.</i>		102	10	—
12 10 —				
* * * * *				
<i>A. Benson his Accompt in Co. Dr. to ditto his A. P. for his ¼ of bounty on barley</i>		4	3	4
<i>H. Primrose his Accompt in Co. Dr. to ditto his A. P. for ditto</i>		4	3	4
15. —				
<i>J. Vernon Dr. to J. Fullerton, his Accompt Sugar, for 13 hds. qt. 156 C. at 46s. 8d.</i>		364	—	—
<i>J. Fullerton, his Accompt Sugar, Dr. to Sundries,</i>				
<i>To Charges Merchandize,</i>				
for cellar-rent and charges, L. 3 13 10				
<i>To Commission accompt,</i>				
for commission on L. 1984, at 2 per cent. 39 13 7				
<i>To Insurance of Debts,</i>				
for insurance on ditto, at 1¼ — 29 15 2				
<i>To J. Fullerton his Accompt-current,</i>				
for nett proceeds per accompt sales 1617 19 7		1691	2	2
18. —				
<i>Bills Payable Dr. to Cash,</i>				
Paid bill to J. Hawkins, 16 Jan. 9 mdt. L. 74 12 —				
to W. Bakewell, 15 Aug. 2 mdt. 375 — —		449	12	—
20. —				
<i>R. Tompkins, Aldergate, my Accompt in Co. Dr. to ditto my Accompt-proper, for my half share of East India goods, purchased by him on our joint accompt, viz.</i>				
Tea — — — — L. 315 — —				
Pepper — — — — 128 — —				
Musslin — — — — 201 — —				
L. 644 — —				
Whereof my half is —		322	—	—
<i>R. Tompkins my Accompt-proper Dr. to J. Barneveldt my Accompt debts, for my bill on ditto Barneveldt, to ditto Tompkins, 25 dft. f. 3000, at 22¼d.</i>		278	2	6

London, 20 OCTOBER 1772.

<i>Sundries Drs. to H. Primrose, his Accompt-proper,</i>			
<i>A. Benson his Accompt-proper, paid to him</i>	L. 91	18	8
<i>Cash, paid to me</i>	116	2	8
	208	1	4
25.			
<i>Cash Dr. to J. Thornton, my Accompt current, for his bill</i>			
<i>on L. Golbourn, 22 ult. ufa. being value of M. 753 : 8</i>			
<i>current, agio 15 percent. M. 655 : 3½ banco, ex. 33s. 10d.</i>	52	8	8
30.			
<i>R. Tompkins, my Accompt-proper, Dr. to ditto my Accompt</i>			
<i>in Co. for my half share of tea sold by him, for L. 325</i>			
<i>ready money</i>	162	10	—
<i>Cash Dr. to R. Tompkins, my Accompt-proper, for G. Mil-</i>			
<i>ford's bill on H. Van Tromp, Amsterdam, ufa. 1500</i>			
<i>banco, at 22½d.</i>	140	12	6
<i>J. Hazard Dr. to Insurance-accompt, for amount of pre-</i>			
<i>miums on sundry ships insured at his office this month,</i>			
<i>per insurance-book</i>	36	10	—

London, 1 NOVEMBER 1772.

<i>Cash Dr. to Sundries,</i>			
<i>To Goods from Gottenburgh,</i>			
<i>for 5 tons iron, at L. 17 : 5s.</i>	L. 86	5	—
<i>To Share of Ship Diligence,</i>			
<i>for one half of my share</i>	300	—	—
	386	5	—
<i>J. Udney, my Accompt-current, Dr. to Voyage to Constanti-</i>			
<i>nople, for nett proceeds of the cargo per the Fortunate,</i>			
<i>Allen, per accompt sales, 167250 aspers, at ¾d.</i>	418	2	6
<i>F. Pizoni, my Accompt-current, Dr. to J. Udney my Ac-</i>			
<i>compt-current, for remittance by ditto Udney to him on</i>			
<i>my accompt, 1070 ducats, being value of 99510 aspers,</i>			
<i>at 93 aspers per ducat, ex. 4s. 3d.</i>	227	7	6
<i>J. Udney his Accompt Dr. to Interest-accompt, for 3 months</i>			
<i>interest on L. 620 : 9 : 6</i>	7	15	—
<i>Bills Receivable Dr. to J. Udney his Accompt, for his bill</i>			
<i>on C. Preston, 30 dft.</i>	628	4	6
6.			
<i>P. Pignatelli to be credited inner column for commission</i>			
<i>on 500 crowns, at ½ per cent. 2½ crowns</i>			

London, 6 NOVEMBER 1772.

<i>P. Pignatelli Dr to F. Pizoni, for his bill on him on my accompt, 739 ducats. being value of 502½ crowns, ex. 68 crowns per 100 ducats, at 4s. 3d. per ducat</i>		157	—	9
<i>A. and T. Hopp Dr. to J. Udney. my Accompt, for my bill on do. Udney, remitted them 67740 aspers, at 212 aspers per L. Flemish, f. 1917 : 3 banco, agio 3 per cent. f. 1974 : 13 current, ex. 35s. 6d.</i>		180	—	3
<i>Bills Receivable Dr. to Share of Ship Diligence, Received J. Bishop's bill, 2 mdt. L. 292 : 10s. being my proportion of the sum insured on the said ship, lost at sea.</i>				
The whole sum insured is		L. 1800	—	—
Deduct 2 per cent. per agreement		L. 36	—	—
and ½ per cent. brokerage		9	—	—
		45	—	—
		L. 1755	—	—
of which my ⅔ share is		292	10	—
<i>Cash Dr. to J. Barneveldt, my Accompt of Debts, for his bill on J. Philpot, 6 ult. usa. being value of f. 7462 current, agio 3 per cent. f. 7244 : 13 banco, ex. 35s. 6d.</i>		680	4	11
<i>J. Fullerton, his Accompt-current, Dr. to Cash, paid his bill on me to A. Seton, 30 dft.</i>		1000	—	—
<i>13.</i>				
<i>Sundries Drs. to D. Mason, my Accompt Goods, for sales of the remainder of the cargoes per the Dolphin and Mermaid, and part of the cargo per the Swift,</i>				
<i>D. Mason, my Acc. current, Currency. Sterling.</i>				
for ready money sales		L. 245	—	—
		L. 163	6	8
<i>Ditto, my Accompt Debts,</i>				
for sales on credit		218	—	—
		145	6	8
<i>J. Fullerton his Acc. current,</i>				
for goods sold him		345	—	—
		230	—	—
		L. 808	—	—
		ex. 150		
<i>D. Mason, my Accompt-current, Dr. to ditto my Accompt of Debts, for payments received by him for goods formerly sold, L. 367 : 10s. currency</i>		245	—	—
<i>D. Mason, my Accompt Goods, Dr. to ditto my Accompt Debts, for a debt become desperate, L. 60 currency</i>		40	—	—
<i>J. Dickenson Dr. to D. Mason, my Accompt-current, for his bill on him on my accompt, L. 180 : 19 : 3, being value of L. 195 : 8 : 10 currency of New York, ex. L. 108 of New York, per L. 100 of Barbadoes</i>		120	12	10

London, 13 NOVEMBER 1772.

<i>Providence Plantation Dr. to B. Lincoln his Accompt-current, for a cargo provisions from him, L.160 currency</i>	106	13	4
<i>Voyage from Barbadoes per the West Indian, Jefferies, Dr. to Providence Plantation, for the remainder of this year's produce, shipped by D. Mason, viz.</i>			
8 hds. sugar 10 C. each, is 80 C. at 36s. L.144 — —			
12 C. ginger, at L.4 : 10s. — 54 — —			
6 C. pimento, at L.3 : 5s. — 19 10 — —			
	217	10	—
<i>Sundries Drs to D. Mason, my Accompt-current, Providence Plantation,</i>			
for charges thereon, inclu- Currency. Sterling.			
ding his salary L.1383 12 — L.922 8 —			
<i>D. Mason, my Acc. Goods,</i>			
for charges on goods • 48 — — 32 — —			
L.1431 12 —	954	8	—
18. — — —			
<i>Barley Dr. to Goods Receivable, Received from A. Young 500 qrs. in part of the quantity contracted for 3 August, at 24s. — — —</i>	600	—	—
22. — — —			
<i>R. Tompkins, my Accompt-proper, Dr. to ditto my Accompt in Co.</i>			
for my share of the muslins sold by him L.215 — —			
and part of the pepper — 30 — —			
to J. Hawkesworth, per bill 6 mdt. L.245 — —			
My half, deducting 6 months interest, comes to	119	8	9
<i>Pepper Dr. to R. Tompkins, my Accompt in Co. received my half share of the remainder of the pepper, being 700 lb. at 1s. 6d. — — —</i>	52	10	—
<i>Cash Dr. to Sundries,</i>			
To R. Tompkins, my Accompt-proper, in full L.97 8 9			
To Will. Hooper, in full — — 5 16 8			
	103	5	5
<i>Insurance-accompt Dr. to Cash, Paid a loss of L.70 insured in May last, per the Norfolk, Home, from London to Grenada, discount 2 per cent. — — —</i>	68	12	—

London, 30 NOVEMBER 1772.

Sundries Drs. to Bills Receivable, for the following discount-
ed at the shop of Honeywood and Co.

J. Udney on C. Preston, 30 dñt. from 1 cur. L.628 4 6

My bill on J. Bishop, 9 cur. 1 mdt. - 292 10 —

L.920 14 6

Cash, received for above - - L.919 18 —

Interest-accompt, for discount - - — 16 6

920 14 6

Fitzherbert and O'Haro to be credited inner column for
com. on L.624 : 15s. at $\frac{1}{2}$ per cent. L.3 2 5

Postages - - — 5 1

L. 3 7 6

Sundries Drs. to Cash,

Fitzherbert and O'Haro, Paid their bill to C. Lucas, 14
cur. 14 dñt. L.315 : 15s. Irish, ex. $9\frac{3}{4}$ L.289 — 3

Will. Lowther, Paid his bill to J. Green, 27
ult. 1 mdt. - - 600 — —

A. Young, paid his bill to P. Neilson 17 cur.
10 dñt. - - 450 — —

1339 — 3

J. Hazard Dr. to Insurance-accompt, for amount of pre-
miums on fundry ships insured at his office this month,
per insurance-book - - - 43 12 6

London, 1 DECEMBER 1772.

F. Pizoni, my Accompt-current Dr. to Voyage from Liver-
pool to Venice, for nett proceeds of the cargo per the
Industry, Smith, sold by him for ready money, ducats
3550, ex. 4s. 3d. - - - 754 7 6

F. Pizoni, my Accompt of Debts Dr. to Adventure to New-
foundland Fishery, for nett proceeds of the cargo per the
Grampus, Hardie, sold by him 3 months credit, ducats
1820, ex. 4s. 3d. - - - 386 15 —

George Hardie Dr. to F. Pizoni, my Accompt-current, for
what he has paid him, ducats 400, ex. 4s. 3d. 85 — —

5.

Cash Dr. to F. Pizoni, my Accompt-current, for my bill
on him to J. Bell, ufa. ducats 3481, ex. 4s. 3d. 739 14 3

JOURNAL B.

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London, 10 DECEMBER 1772.

J. Ritchie Dr. to Cash, for J. Hunter's bill on R. Mills,
7 ult. 30 ddt. indorsed by ditto Ritchie, and paid by
me supra protest, for his honour, L. 300 — —
Charges — 7 6

300 7 6

— 12. —

Sundries Drs. to Voyage to Lisbon in Co. for nett proceeds
of the cargo per the True Briton, Fisher, sold by F.
Brago, milrees 2430, ex. 5s. 6½d. L. 673 : 6 : 3,

H. Primrose his Acc. proper, Milrees.
for wine shipped on his accompt 1050 L. 290 18 9
A. Benson, his Accompt proper,
for salt shipped on his accompt 520 144 1 8
F. Brago, my Accompt, for balance 860 238 5 10

673 6 3

2430

A. Benson, his Accompt in Co. Dr. to ditto his Accompt proper, for his $\frac{1}{4}$ of above — — —

224 8 9

H. Primrose, his Accompt in Co. Dr. to ditto his Accompt proper, for ditto — — —

224 8 9

Voyage to Lisbon in Co. Dr. to Sundries, for profit L. 49 : 2 : 3,
To A. Benson, his Accompt in Co. for his $\frac{1}{4}$ L. 16 7 5
To H. Primrose, his Accompt in Co. for his $\frac{1}{4}$ 16 7 5
To Profit and Loss, for my $\frac{1}{4}$ — — 16 7 5

49 2 3

Sundries Drs. to Cash,
A. Benson, his Acc. proper, paid him in full L. 80 7 1
A. Young, paid him in part — 300 — —

380 7 1

— 19. —

Sundries Drs. to Bills Receivable, for bill on J. Garner,
7 Oct. 2 mdt. at L. 315 : 4s. compounded at 15s. per L.
ditto Garner being insolvent,

Cash, for composition received — L. 236 8 —
Profit and Loss, for loss on my proper debt 8 6 —
Insurance of Debts, for loss on debt arising
from the sale of Fullerton's sugar insured 70 10 —

315 4 —

Adventure to Newfoundland Fishery Dr. to George Hardie,
for 8 months freight, at L. 25 — —

200 — —

George Hardie Dr. to Cash, paid him in full — —

67 10 —

— 20. —

Cash Dr. to Bills Receivable, for bill on J. Parker, 17th
August 4 mdt. — —

342 — —

3 E

London, 20 DECEMBER 1772.

<i>Bills Receivable Dr. to A. and T. Hopp, for G. Milford's bill on H. Van Tromp, 30 Oct. usa. f.1500,agio 3 per cent. f.1545 taken up by them for my honour, supra protest, with charges, f.1548, and returned, at 23d. L.148 : 7s. For which received R. Tompkin's bill on A. Pigot, 2 mdt.</i>			148	7	—
<i>A. and T. Hopp to be credited inner column for commission on f.11836 : 5, at $\frac{1}{2}$ per cent.</i>					
	<i>f.59 : 3</i>				
	<i>Postages</i>	<i>5 : 10</i>			
	<i>f.64 : 13</i>				
<i>22...</i>					
<i>Bills Receivable Dr. to A. and T. Hopp, for their bill on W. Blake, 2 mdt. being value of f.362 current, agio 3 per cent. f.351 : 9, banco, ex. 35s. 6d.</i>			33	—	—
<i>31.</i>					
<i>Insurance accompt Dr. to J. Hazard, for brokerage due him on L.94, at 6d. per L.</i>			2	7	—
<i>J. Hazard Dr. to Cash in full</i>			64	2	6
<i>Sundries Drs. to Cash,</i>					
<i>Charges Merchandize, for 3 months charges</i>	<i>L.12 12 —</i>				
<i>Proper expences, for 3 months expences</i>	<i>170 — —</i>				
			182	12	—
<i>J. Ritchie Dr. to Sundries,</i>					
<i>To Interest-accompt, for interest due by him</i>	<i>L.29 10 3</i>				
<i>To Commission-accompt, for commission on L.1943, at $\frac{1}{2}$ per cent.</i>	<i>4 17 1</i>				
<i>To Charges Merchandize, for postages</i>	<i>— 13 4</i>				
			35	—	8
<i>J. Ritchie's accompt to be balanced by L.1107 : 7 : 9 due by him to Dr. new accompt.</i>					
<i>Interest-accompt Dr. to P. Darceville, Exchange-accompt, for interest due by him Lrs.18 : 10</i>			4	16	10
<i>P. Darceville to be credited inner column for his $\frac{1}{2}$ share of profit Lrs 175 : 9 of postages 10 : 15</i>					
	<i>186 : 4</i>				
<i>P. Darceville, Exchange-accompt Dr. to Profit and Loss, for my share of profits</i>			7	1	4

London, 31 DECEMBER 1772.

P. Darceville, Exchange-accompt to be balanced by
Lrs. 5404 : 14, ex. 29d. L.217 : 13 : 9 due him to Cr.
new accompt ; but first replace to Cr. and Dr. new ac-
compt an outstanding bill in his hands Lrs.3240 : —,
L.133 : 7 : 6

Ja. Hartley Dr. to Interest-accompt, for interest due by
him

Ja. Hartley's accompt to be balanced by L.596 : 9 : 10
due by him to Dr. new accompt, per accompt settled
this date.

35 7 3

3 E 2

NOTES

§ 107. NOTES, explaining the more difficult TRANSACTIONS and JOURNAL ENTRIES.

A. Feb. 1. The greater part of the duties to which tobacco imported is liable, may be secured on bond for 18 months. If it be re-exported, the duties that had been paid are returned, and the bond for the remainder is discharged. It is obvious that, if all the duties had been paid down, B. Lincoln's Accompt Tobacco would have been charged Dr. to Cash for the amount: And although, in the present case, part of the duties be secured, the proprietor is nevertheless chargeable with the whole, because Parker the factor is liable for the bond, and must see it discharged. Cash is Cr. for the duties paid, and the Custom-house, to which the bond is granted, is Cr. for the duties secured. The entries, when the bond is discharged, are explained in Note F*.

B. Feb. 10. This complex article must be resolved into two simple ones, which are journalized separately. Because the tobacco is deliverable free on board, Barneveldt is only Dr. for the amount, at $2\frac{1}{2}$ d; and because the proprietor is liable for charges on the goods consigned, B. Lincoln's Accompt Tobacco is Dr. to Cash for the same.

C. Feb. 13. This article differs from that explained in the last note, because Dupont is liable for the charges, as well as the price of the tobacco. It may be journalized two ways. Dupont may be charged Dr. to Lincoln's Accompt of Tobacco for the price only, and to Cash for expences of shipping: Or he may be charged Dr. to Lincoln's Accompt of Tobacco for the amount, including expences; and in that case Lincoln's Accompt of Tobacco must be charged Dr. to Cash for the expences in a separate post. If the former method be followed when the Accompt Sales is drawn out, the price only will be stated as one of the articles which compose the gross proceeds of the tobacco, and no notice will be taken of the expences. If the latter be followed, the whole sum due by Dupont is stated among the gross proceeds, and the expences are deducted along with the other charges. We prefer the second method, because it is reasonable, in case of Dupont's bankruptcy, that the factor be reimbursed for the charges, unless the debts be insured; and that risk would not be exhibited in the Books or Accompt Sales, if the former method were followed.

D. Feb. 13. It is obvious that both insurances must be brought to the Cr. of John Hazard; and as the first is on a cargo sent to Barbadoes belonging to the holder of the books; the other on the tobacco sent to Barneveldt; Voyage to Barbadoes is therefore Dr. for the former, and J. Barneveldt for the latter.

E. Feb. 23. A bill is said to be discounted when it is indorsed to any person or company which pays the value, deducting the interest from the time that the money is advanced, to the time that

* The duties on tobacco, and several other articles, are altered by the consolidation-act since these sheets went to the press.

that the bill falls due. Because the bill is delivered, the account of Bills Receivable is Cr. for the whole sum; Cash is Dr. for the money received, and Interest-account for the deduction.

Note F. Feb. 24. This and the two preceding articles relate to the discharge of the tobacco-duties. In order to understand the journal-entries, we must compare them with the article of 1st February, when the duties were paid or secured. If all the tobacco had been re-exported, and the bond discharged, the journal-entry would have been, *Custom-house Bonds Dr. to B. Lincoln's Account Tobacco*, for the amount of the bond, being exactly opposed to the entry when the bond was granted, as directed § 71, 3d. If the whole duty paid at importation had been drawn back, we would have entered, *Cash Dr. to B. Lincoln's Account Tobacco*. If all the tobacco had been sold at home, and the bond paid at the end of 18 months, we would have entered, *Custom-house Bonds Dr. to Cash*, for the amount of the bond; but if part were abated for prompt payment, Custom-house Bonds would be Dr. to Cash for the sum paid, and to B. Lincoln's Account Tobacco for the abatement. As the case stands, two-thirds of the tobacco are re-exported, and one-third sold at home. On the former, a proportion of the bond is discharged, and the duties formerly paid returned. On the latter, the bonded duties are paid up, and an abatement allowed, which is computed at 10 per cent. for 17 months. The journal entries are regulated accordingly.

G. March 4. The owner of the books here employs J. Vernon of Bristol to ship goods for Virginia, by order of B. Lincoln, and agrees to allow him one half of the commission which Lincoln is charged with; therefore Vernon is Cr. for the value of the goods he provides, and his share of the commission, and *Commission-account* is Cr. for the half of the commission, which the owner of the books retains.

H. March 10. When the American trade was open, a considerable number of ships were built in the northern provinces, and sent home to Britain for sale. These ships were generally loaded with lumber to the West-Indies, and there took in sugar on freight for London. Sometimes they made several voyages before they came home. As the purchase of the ship and success of the voyages are properly but one adventure, they are joined in the same account, and the gain estimated on the whole. See articles 19 June, 18 and 24 July, and 28 September.

I. March 21. We have divided this article into two journal-posts, and charged Hardie Dr. to Cash for the money advanced him. As this money is to be expended at the fishery, we might have charged the Adventure to Newfoundland Dr. for the whole; but it is rather more regular to charge Hardie for the money delivered him, and to charge the Adventure Dr. to Hardie for the amount of his disbursements. See article 1 September.

K. March 21. This article is one of the kind explained § 27.
In

In order to prevent the embarrassment of a journal-post complex on both sides, and at the same time to save the trouble of opening an accompt in the ledger for Blackney, which is not otherwise needed, we have entered the article on the supposition that money had been received for the whole, and that part of the money had been lent on bill to Blackney.

Note L. March 27. A debenture is an obligation granted by the custom-house for bounty or draw-back of duty. Some debentures remain long unpaid; because there are particular funds appointed to discharge them, and these funds are sometimes deficient. They pass at a greater or less discount, according as they are likely to be soon paid. The value must be placed to the Cr. of the goods, or voyage from which the benefit arises.

M. April 15. If we purchase debentures from others, or retain those which arise in the course of our own trade, we must enter them on the Dr. of a ledger-accompt, when received, according to their current value, and on the Cr. of the same accompt, when sold or paid. Interest may be computed on this accompt, if necessary; and then, if all the debentures be disposed of, the balance will show the gain or loss. In the present article, Vernon having exported a quantity of beer in bottles, some for Parker, some for others, receives a debenture for the drawback of the excise which had been paid on the glass when manufactured, and transmits it to Parker. As part of the bottles belonged to Parker, he is intitled to retain a proportion of the drawback, and is only accountable for the overplus. The Accompt of Debentures is therefore Dr. to the voyage from which the benefit arises, for the former, and to Vernon for the latter.

N. April 22. When the charges are posted on the Dr. of the accompt of Port wine in the ledger, the number of dozens and bottles are entered in inner columns; and as the number of pipes on hand is diminished, the pipe sold is entered on the credit of the inner column for pipes, in order to preserve the balance. A like method must be followed, when a cask, or package of any goods, is opened for retail.

O. April 28. We have followed the method explained § 56. of placing all the debts due us, that are constituted by bills, to the accompt of Bills Receivable. In conformity thereto, if a bill were granted for a debt formerly entered on a personal accompt, we would transfer it, by charging *Bills Receivable Dr. to J. Almond*; and if this bill were afterwards delivered to Vernon, or any other person in trust for him, we would charge *J. Vernon Dr. to Bills Receivable*. Here the delivery is made at the same time the bill is granted; and because the debt which Almond owed is transferred to Vernon, we enter *J. Vernon Dr. to J. Almond*.

P. May 6. In this and the foregoing article we have an example of goods sent to the same person, and by the same ship, some in the way of consignment, others in the way of sale. With
respect

respect to the former, the transaction falls under the head of foreign trade, § 68. ; with respect to the latter, under that of factorage, § 75. 6th.

Note Q May 20. The wheat and barley, when purchased, were charged to the Dr. of J. Farmer, my Accompt Corn. As they are now sent to sea, the charge must be transferred to the Accompt of Voyage to Amsterdam. The commission and charges were not entered before, and as they constitute part of the value of the cargo, and increase the debt due to Farmer, they must be placed to the Cr. of his accompt-current.

R. May 26. If we keep the debenture, we place it to the credit of the voyage at the value for which we could have sold it. See Note M.

S. May 31. The business of insurance on shipping is conducted by brokers. An insurer generally engages for a small sum only on the same ship, and the risk is divided among many, which contributes to the safety of those concerned, and the benefit of the public. If we had occasion to procure insurance for L. 1000, it might be necessary to apply to 20 different persons, as none may be willing to engage for more than L. 50. To render the business easy, we may apply to a broker who extends the policy or contract of insurance, and procures subscriptions to the extent desired. The insurers who subscribe their names, and the sums they engage for, are called *underwriters*. The premiums are paid to the broker, who accounts to each underwriter for his proportion, after deducting an allowance for his own trouble. In the present article, and in those of 31 October and 30 November, the owner of the books subscribes the policies transacted at Hazard's office. As Hazard is accountable for the premiums, the journal-entry is, *J. Hazard Dr. to Insurance Accompt.*

T. June 8. This article may illustrate the method of supplying shipmasters, or others, with credit abroad. The person to whom the letter of credit is directed, furnishes the money or goods, sends home the debtor's bill for the value, in foreign money, and reimburses himself, by drawing a bill according to his employer's directions. The exchange upon the bill is settled between the parties at home, and should be such that the granter of the credit may have a reasonable profit for his risk and trouble.

U. June 19. The substance of the advices received from D. Mason, who manages the plantation and other business at Barbadoes, is ingrossed in this and the four preceding articles. The same is done 8 August and 13 November, when fresh advices are received. The journal entries are so regulated as to exhibit every kind of property abroad, under the titles explained, § 68. suited to its particular circumstances.

W. June 20. The learner may think that A. and T. Hopp should have received credit for the whole bill, and that the discount should have been charged to Interest accompt, as was done with respect to the bills discounted 23 February. The method we have entered

entered it in is better ; for Messrs Hopps procure a more favourable exchange, by making their remittance at so long a date as double usance ; but as that advantage is compensated in whole, or in part, by the inconvenience of lying out of the money, or the allowance given for advancing it, we should only bring the present value of the bill to account, in order to determine our gain or loss on the transactions which gave occasion to the remittance.

Note X. July 3. Mr Beaumont is supposed to travel, and to carry along with him letters of credit from Parker, on places where he will have occasion for a supply of money. Accordingly, he is supplied by Brago at Lisbon in this article ; by Spendoza at Madrid, 5 August ; and by Pignatelli at Rome, 25 September. These transactions are of the same nature as that explained Note S.

Y. July 12. When we import a cargo of different kinds of goods which could not well be separated, such as iron and deals ; of which the one is necessary for ballast, and the other to complete the lading, it is proper to join them in one account, and compute the profit or loss on the whole together. Here we open an account of goods from Gottenburgh, and distinguish the iron and deals in inner columns, which is better than to open one account for iron, and another for deals. Perhaps there might be gain on the one and loss on the other ; but as we were obliged to import both together, it is the success of the whole that we should inquire into. When the goods are sold, the journal-entries must be in conformity to this original one.

Z. Aug. 1. The design of protesting a bill was explained PART III. § 8. The bill mentioned in this article is understood to have been sent by Ritchie to Parker some time ago ; but, agreeably to the method explained, § 59. and uniformly followed in this set, it was not entered to Ritchie's Cr. when received. It may, therefore, seem unnecessary to charge it on his Dr. when returned. However, since the commission due by Ritchie depends on the extent of the transactions, and is charged on the sum of the account-current ; and since it is reasonable that commission be allowed on bills returned, which occasion more trouble to the agent than bills that are duly paid, it is proper to enter it on both sides of the account, as the journal-entry directs.

AA. Aug. 5. Spendoza adds the commission due him to the money advanced to Beaumont, and draws for the amount on Brago of Lisbon, in consequence of orders from Parker. The commission is entered on the Cr. of the inner column, as directed § 80.

BB. Aug. 8. The charges on the two former cargoes are placed to the Dr. of D. Mafon's Account Goods, because the goods are now in his custody, and the accounts of the voyages discharged : But the charges on the cargo per the Mercury are placed to the Dr. of the voyage, because the goods were never transferred to Mafon's custody, but sold off immediately, and the account of the voyage is still open. See § 72.

Note CC. Sept. 25. This article requires two journal-entries; one to discharge the bargain of 6th July, by reversing the journal-post of that date, as directed § 71. 3d.; another for the receipt of the penalty.

DD. Nov. 6. The sugar shipped for Udney, 6 May, was bought at 4 months credit, and paid 9 Sept. Udney should therefore have remitted the value two months ago; and as his remittance has a month to run, he has added the three months interest to the amount of the invoice. We divide the article into two journal-posts. In the first, we charge him with the interest; and, in the second, give him Cr. for the remittance. We have departed, in this article, and in the article of 22 December, from the general method, of reserving the entries of bills remitted us, till payment, explained § 59. and followed the method § 60. Our reason is, that these bills are in full payment of the balance due on the respective accompts, and it is better to balance the accompts when the remittances come to hand. If the bills had not been duly paid, we would have opened the accompts again, by reversing the entries when they were protested for non-payment.

EE. Nov. 6. When a bill is sent to a foreign country, drawn in a different kind of money from that which is current in the place it is sent to, we must leave the sum blank till we receive advice of the course of exchange by which it is transacted. This advice is received from Messrs Hopps, 22 December. The words in the journal-narration, printed in Italics, are left blank when the post is first entered. The article in the waste-book, 22d December, enables us to supply them, but does not contain matter for a new journal-post; it only completes the former one.

FF. Nov. 13. The debts due for goods sold in Barbadoes, which are under D. Mason's charge, are not entered in Parker's books, on the accompts of the particular debtors, but on the general accout of D. Mason, my Accout of Debts. But the debt due by Fullerton, which is not to be paid to Mason, but compensated by other transactions with Parker, is entered on his particular accout.

GG. Nov. 13. This article does not afford matter for a journal-entry, but is necessary for ascertaining the profits on the goods sent to Barbadoes.

HH. Nov. 13. As the debt which is become desperate must be deducted from the amount due us at Barbadoes, it is obvious that it must be brought to the Cr. of D. Mason my Accout debts. Perhaps the learner might have entered it thus, *Profit and Loss Dr. to D. Mason my Accout Debts*. The entry we have given is more proper. By the former, the gain exhibited on the accout of goods would not be diminished by the losses which arise from bad debts on the same, but these losses would be brought to the general accout of Profit and Loss: By the latter, the losses are deducted, and the nett gain only exhibited. Now, in judging of the advan-

tage arising from our trade to Barbadoes, it is a material circumstance to attend to the bad debts which that trade occasions. The extent of these depends on the particular situation of that country; and the losses are introduced with more propriety in opposition to the gain which that trade yields, than in opposition to the profits of our business in general.

Note II. Nov. 13. It is necessary to know the value of the plantation in its present state of improvement, in order to determine the gain or loss.

KK. Nov. 22. As Tompkins agrees to pay the value, interest deducted, the same is placed to the Dr. of his accompt. In this, and the like articles, where interest is deducted on goods sold, there is nothing entered on the Dr. of Interest accompt, and the nett sum only is placed to the Cr. of the accompt to which the sales belong.

LL. Dec. 10. When merchants indorse bills which they suspect may be refused, it is common to address them, by a note at the foot, to their own correspondent at the place of payment; and upon their being refused and protested, the person to whom they are thus addressed pays them for the honour of the indorser. This prevents the expence and loss of credit which arise from the bills being returned. In the present article, Ritchie is supposed to have written thus at the foot of the bill when he indorsed it, *In case of need, apply to Mr William Parker for J. Ritchie*: and, upon the bill's being refused by R. Mills, and protested for non-payment, the possessor applies to Parker, who pays it, with expences, and transmits it to Ritchie, who has a claim against Hunter the drawer, for the value, with re-exchange and charges. The notary annexes a narration of the payment *supra protest* to the protest; which narration is called an *act of honour*.

MM. Dec. 19. The loss on Garner's bill must be distinguished, and placed to different accompts, as arising from different articles. That part of it which arises from goods of our own, is loss, in the most proper sense, and is therefore placed to the Dr. of Profit and Loss: But that which arises from Fullerton's sugar, for the risk of which we received a consideration, is to be compared with the consideration received, and the difference only is to be accounted loss; therefore it is placed to the Dr. of Insurance of Debts.

NN. Dec. 20. The method of transacting the payment of bills *supra protest* was explained Note KK. In that article, Parker paid the bill for Ritchie; in the present one, Messrs Hopps pay it for Parker. If Parker had not immediately recovered a consideration for the bill, Tompkins the drawer would have been Dr.; but because he has accounted for it, the thing received is Dr.

OO. Dec. 31. Various articles have been sold to Hartley, and bought from him at a limited credit. In computing the interest, each article is charged at the date that the credit expired.

PP. The inventory, together with the articles of advice from D. Mason, affords materials for balancing the books. In the former

mer set, the balance-articles are inserted in the journal; in this they are placed at once in the ledger.

When a foreign account is balanced, if gain or loss arise from the variations of exchange, it is better to enter the same directly, as we have done in J. Gordoqui's account 20 January, A. and T. Hopps 2 March, and P. Dupont 11 March, though we have reserved some others of the same kind to the general balance. And if the gain or loss be immediately connected with some other account, it is better to transfer it to that Account, than to Profit and Loss. Thus the gain on C. Meldrup's account might have been transferred to the Cr. of Voyage from Newcastle, from which it was derived.

The following article was omitted in the Journal.

7 DECEMBER.

P. Darceville, *Exchange-account Dr. to Cash*,
for J. Deans on C. Martinet, 30 ddt. Lrs. 324⁰
remitted him, ex. 20¹/₄d. -

L. 133 17 6

3 F 2

LEDGER.

		Dr.	Stock,			
1772						
Jan. 1.	To Sundries for debts due by me, per J.			2219	8	4
Dec. 31.	To Balance-account for nett Stock			7206	8	2
				9425	16	6
		Dr.	Profit and Loss,			
1772						
Mar. 2.	To A. and T. Hopp, for loss by exchange			2	8	9
11.	To P. Dupont, for loss by exchange			1	1	11
Dec. 19.	To Bills receivable for loss on J. Garner's bill			8	6	—
31.	To A. and T. Hopp for loss by exchange			2	16	9
	To Alum			16	2	6
	To Share of ship Diligence			97	10	—
	To House in Fleetstreet			120	—	—
	To Charges merchandize			18	6	1
	To Insurance of debts			13	10	10
	To Proper expences			438	3	—
	To Debentures				1	8
	To Voyage to Constantinople			39	6	—
	To Voyage from Newcastle to the Baltic			6	12	—
	To Goods from Gottenburgh			32	2	—
	To Sugar			22	4	3
	To J. Barneveldt my account debts			3	10	10
	To Voyage from Liverpool to Venice			60	17	6
	To P. Pignatelli, my account for loss by exchange			4	19	1
	To J. Udney, my account for ditto			10	14	9
	To Stock for nett gain			676	13	2
				1575	7	1
		Dr.	Cash,			
1772						
Jan. 1.	To Stock on hand			205	8	6
3.	To Barley, for 100 quarters at 25s.			125	—	—
14.	To Sundries, per J.			398	15	—
20.	To Ja. Ritchie for his bill on Hog and Kinloch, 17 Nov. 2 mdt.			356	8	—
—	To Sundries, per J.			275	—	—
28.	To Sundries for bill on Evans and Fenton, with int. per J.			304	8	9
Feb. 23.	To Bills receivable, for sundry bills discounted, per J.			2148	15	4
24.	To B. Lincoln his ac. tobacco received back old subsidy, per J.			262	10	—
				4076	5	7
				Carried forward		

	Contra	Cr.			
1772					
Jan. 1.	By Sundries for articles belonging to me, per J.	-	8749	3	4
Dec. 31.	By Profit and Loss for nett gain	-	676	13	2
			9425	16	6

	Contra	Cr.			
1772					
Jan. 20.	By Jof. Gordoqui, for gain by exchange	-		16	8
Sep. 25.	By Cash, received penalty from A. Young	-	10		
Dec. 12.	By Voyage to Lisbon in Co. for one-third gain	-	16	7	5
31.	By P. Darceville, for gain by exchange	-	9	12	1
	By Fitzherbert and O'Haro, for gain by exchange	-	7	1	4
	By Bar ey	-	94	1	
	By Spanish wool	-	103	6	2
	By Providence plantation	-	186	8	8
	By Linen	-	10	8	4
	By Interest-accompt	-	61	15	5
	By Muslin	-	5		
	By Commission-accompt	-	156	4	11
	By Cyder	-	8	15	4
	By Ship Liberty and voyage from New York	-	160	9	3
	By James Dickenfon my accompt, for gain by exchange	-	1	10	2
	By Spanish salt	-	1		10
	By Adventure to Newfoundland fishery	-	16	10	
	By Port-wine	-	38	14	9
	By J. Velasquez my accompt goods	-	55		8
	By Voyage from Madeira to Barbadoes	-	40	17	8
	By Voyage from Kingston to Amsterdamb	-	304	15	
	By Insurance-accompt	-	23	1	9
	By Bills of exchange	-	3	2	6
	By Geo. Hay, my accompt for gain by exchange	-	2	3	9
	By C. Meldrup, my accompt for ditto	-		5	7
	By D. Mafon, my accompt of goods	-	122	5	
	By Claret	-	1		
	By F. Brago, my accompt for gain by exchange	-	2	15	8
	By P. Mof, my accompt for ditto	-	7	2	4
	By J. Spendoza, my accompt for ditto	-	4	2	
	By Voyage to Hamburgh	-	107	11	6
	By J. Thornton, my accompt-current for gain by exchange	-		12	7
	By R. Tompkins, my accompt in Co.	-	12	8	9
			1575	7	1

	Contra	Cr.			
1772					
Jan. 9.	By J. Gordoqui, paid his bill to P. Vasconcello, per J.	-	52	10	
10.	By Linen in part, per J.	-	156	5	
16.	By Voyage to Madeira, per J.	-	116	6	
20.	By J. Gordoqui, for a bill remitted him, per J.	-	34	3	4
Feb. 1.	By B. Lincoln, his acc. tobacco, paid duty and charges, per J.	-	556	10	
4.	By Ad. and Th. Hopp, paid their bill to L. Clare, per J.	-	284	7	2
10.	By B. Lincoln, his acc. tobacco, paid char. on a cargo to Amst.	-	5	5	
13.	By ditto for charges on a cargo to Bourdeaux	-	3	17	6
15.	By Sundries, per J.	-	323	5	
24.	By Custom-house bonds, paid duty on tobacco, per J.	-	824	6	6
28.	By Sundries, per J.	-	675		
			3031	15	6

Carried forward

	Dr.	Cash,			
1772		Brought forward	4076	5	7
Mar. 10.	To Alum for 10 C. at 17s. 11d.	-	8	19	2
11.	To P. Dupont, for my bill on him to C. D'Eon, per J.	-	337	9	4
18.	To Bills receivable, for G. Byron on J. Hill, 15 Dec. 3 mdt.	-	585	-	-
21.	To Sundries, per J.	-	162	10	-
27.	To Barley, received for a debenture, per J.	-	95	-	-
29.	To Spanish salt in part, per J.	-	16	9	2
Apr. 2.	To J. Hartley, received to accompt	-	200	-	-
3.	To J. Ritchie, for fundry bills per J.	-	404	7	-
—	To Spanish wool, for 4750 lb. at 2s. 5d.	-	573	19	2
18.	To Sundries, per J.	-	393	15	-
May 4.	To Hen. Valville, his accompt claret, for 10 pipes, per J.	-	576	10	-
12.	To House in Fleetstreet, received a half year's rent	-	40	-	-
18.	To Sundries, per J.	-	660	-	-
22.	To Port-wine, for 20 dozen at 15s. 6d.	-	15	10	-
25.	To Sundries, per J.	-	321	-	-
June 1.	To Bills receivable, for J. Pemble on W. Crosbie, 29 Mar. 2 mdt.	-	20	-	-
3.	To A. and T. Hopp for their bill on H. Van Sittart, per J.	-	241	17	11
12.	To Sundries, per J.	-	292	5	-
14.	To J. Ritchie, from J. Harris, on his accompt	-	300	-	-
19.	To A. and T. Hopp, for a bill discounted, per J.	-	286	6	5
24.	To Bills receivable, for bill on W. Blackney, 21 Mar. 3 mdt.	-	100	-	-
26.	To P. Darceville, for my bill on him, per J.	-	133	6	8
July 1.	To Sundries, per J.	-	593	-	-
4.	To Bills receivable, for G. Hay on R. Ellis, 1 May. 2 mdt. per J.	-	187	10	-
6.	To House in Fleetstreet, rec. from the Sunfire Insur. Office	-	500	-	-
8.	To House in Fleetstreet, sold the area for	-	200	-	-
16.	To Sundries, per J.	-	341	14	-
24.	To J. Beaumont, received from W. Manley on his accompt	-	300	-	-
—	To Sugar, for 30 hds. 180 C. at L. 2, 8s.	-	432	-	-
Aug. 7.	To Sundries, per J.	-	288	5	-
17.	To J. Barneveldt, my acco. debts, for my bill to A. Hill, per J.	-	281	13	9
19.	To P. Darceville, for fundry bills, per J.	-	336	10	2
25.	To Sundries, per J.	-	224	16	8
Sept. 8.	To Voyage to Hamburgh, for drawback and bounty, per J.	-	91	9	-
—	To J. Beaumont, received from W. Manley	-	200	-	-
9.	To P. Darceville, for my bill on him, per J.	-	149	7	6
12.	To Share of ship Diligence in part profits	-	60	-	-
15.	To Sundries, per J.	-	267	-	-
25.	To Bills receivable, for bill on H. Wren, 23 Jan. 8 mdt.	-	89	3	4
—	To Profit and loss, received penalty from A. Young	-	10	-	-
28.	To Ship Liberty, sold it for	-	420	-	-
Oct. 12.	To Sundries, received bounty, per J.	-	102	10	-
20.	To H. Primrose, his accompt proper, received in full	-	116	2	8
25.	To J. Thornton, my ac. cur. for his bill on J. Golbourn, per J.	-	52	8	8
30.	To R. Tompkins, my accompt proper, per J.	-	140	12	6
Nov. 1.	To Sundries, per J.	-	386	5	-
9.	To J. Barneveldt, my ac. of debts, for his bill on J. Philpot, p. J.	-	680	4	11
22.	To Sundries, per J.	-	103	5	5
30.	To Bills receivable, for fundry bills discounted, per J.	-	919	18	-
Dec. 5.	To F. Pizoni, my acc. cur. for my bill on him to J. Bell, per J.	-	739	14	3
19.	To Bills receivable, for composition on J. Garner's bill, per J.	-	236	8	-
20.	To Bills receivable, for bill on J. Parker, 17 Aug. 4 mdt.	-	342	-	-
			18632	9	3

	Contra	Cr.			
1772		Brought forward	3031	15	6
Mar. 2.	By A. and T. Hopp, paid their bill to J. Vervins, per J.	863	18	3	
6.	By Cyder, paid balance of 300 casks, per J.	57	10		
14.	By Barley, for 300 qrs. at 23s. 9d.	356	5		
20.	By Sundries, per J.	385			
21.	By George Hardie, advanced him	63			
—	By Bills receivable, for bill on W. Blackney, 3 mdt.	100			
23.	By J. Barneveldt, paid charges shipping a cargo barley	8	12		
28.	By J. Ritchie, paid J. Steinhoff's bill on me on his account	76	12		
31.	By Sundries, for charges and expences, per J.	82	7	6	
April 1.	By Voyage to Barbadoes, per the Swift, Turner, per J.	122	10		
3.	By Thomas Smith, paid him	60			
—	By J. Dickenson, for linen and charges, per J.	57	8	8	
5.	By H. Valville, his acco. claret, pd. freight, duty, & charges, p. J.	1045	10		
19.	By Bills payable, paid bill to J. Priestly, 16 October, 6 mdt.	270			
22.	By Port-wine, paid corks and charges	12	3	9	
May 6.	By Voyage to Constantinople, for hardware and charges, p. J.	183	12	6	
—	By J. Udney, paid charges at shipping a cargo	1	10		
10.	By J. Farmer, my acc. cur. pd. his bill to J. Richards, 27 Ap. 10 ddt.	400			
18.	By Sundries, paid bills, per J.	600			
25.	By J. Hartley, paid him	300			
June 5.	By Bills of exchange, paid for sundry bills, per J.	452	15	6	
17.	By Bills payable, paid bill to J. Ellis, 14 March, 3 mdt.	430			
19.	By Bills payable, paid bill to J. Lardbroke, 16 Mar. 3 mdt.	70	16	8	
29.	By J. Dickenson, paid his bill to D. Deberdt, 60 dft.	250			
30.	By Sundries, paid small charges and expences for 3 months	95	3	4	
July 1.	By Bills payable, paid bill to E. Wynne, 28 Sept. 9 mdt.	500			
3.	By P. Darceville, for a bill remitted him, per J.	163	17	9	
6.	By Bills payable, paid bill to J. Wren, 3 April, 3 mdt.	83	6	3	
8.	By Sundries, paid bills, per J.	741	7		
12.	By Bills payable, paid bill to J. Wilcoat, 10 Jan. 6 mdt.	156	5		
—	By Goods from Gottenburgh, paid freight, duty, and charges	213	12		
18.	By Sugar, paid duty and charges, per J.	88		6	
—	By J. Fullerton, his accmpt. sugar, paid duty and charges	205	7	10	
24.	By Sundries, paid bills, per J.	625	19	10	
Aug. 1.	By Cash, for protest of bill on J. Benson	—	6	9	
11.	By T. Smith, paid his bill to Surtees & Burdon, 8 June, 2 mdt.	231	12		
15.	By Voyage to Hamburgh, paid charges	2	5		
19.	By F. Brago, paid his bill to C. Marriot, per J.	278	9	4	
31.	By Sundries, paid bills, per J.	464	11	6	
Sept. 9.	By Bills payable, paid sundry bills, per J.	651			
28.	By P. Darceville, paid his bill to J. Bougainville, per J.	250			
30.	By Sundries, paid charges and expences for 3 months	103	5		
Oct. 4.	By Bills payable, paid bill to J. Standart, 1 April, 6 mdt.	85			
—	By Voyage to Lisbon in Co. for shoes and charges	78	4		
18.	By Bills payable, paid sundry bills, per J.	449	12		
Nov. 9.	By J. Fullerton, his acc. cur. paid his bill to A. Seton, 30 dft.	1000			
22.	By Insurance-accompt. paid a loss, per J.	68	12		
30.	By Sundries, paid bills, per J.	1339		3	
Dec. 7.	By P. Darceville, for a bill remitted him, per J.	133	17	6	
—	By James Ritchie, for a bill taken up for his honour, per J.	300	7	6	
12.	By Sundries, per J.	380	7	1	
19.	By George Hardie, in full	67	10		
31.	By J. Hazard, in full	64	2	6	
—	By Sundries, paid charges and expences for 3 months	182	12		
—	By Balance-accompt.	297	7	7	
		18632	9	3	

<i>Dr. Barley,</i>					
1772					
Jan. 1.	To Stock, at 24s.	-	Qrs. 500	600	—
Feb. 15.	To Cash, at 24s. 9d.	-	140	173	5
Mar. 11.	To Sundries, per J.	-	700	836	5
Apr. 6.	To J. Hartley, at 24s. 3d. 4 months credit	-	200	242	10
May 20.	To Sundries, from J. Farmer, per J.	-	317	375	19
Nov. 18.	To Goods receivable, from A Young, at 24s.	-	500	600	—
Dec. 31.	To Profit and loss for gain	-	—	94	1
	Outcome		3		
			2360	2922	—
<i>Dr. Alum,</i>					
1772					
Jan. 1.	To Stock, at 17s.	-	C. 310	263	10
May 12.	To Goods receivable, from Thomas Smith, at 16s.	-	200	160	—
			510	423	10
<i>Dr. Spanish Wool,</i>					
1772					
Jan. 1.	To Stock, at 2s. 4d. per lb.	-	B. 100 lb. 19000	2216	13 4
Dec. 31.	To Profit and loss for gain	-		103	6 2
			100 19000	2319	19 6
<i>Dr. Providence Plantation, Barbadoes,</i>					
1772					
Jan. 1.	To Stock, for value, including stocking	-	1500	—	—
June 19.	To Ship Liberty, &c. for lumber	-	80	—	—
Aug. 8.	To D. Mason, my accmpt goods, per J.	-	114	—	—
Nov. 13.	To B. Lincoln, his accmpt-current, for provisions	-	106	13	4
—	To D. Mason, my accmpt-current, for charges	-	922	8	—
Dec. 31.	To Profit and loss, for gain	-	186	8	8
			2909	10	—
<i>Dr. Share of Ship Diligence,</i>					
1772					
Jan. 1.	To Stock, for value of my one-third share	-	800	—	—
			800	—	—

		Contra	Cr.				
			Qrs.				
1772							
Jan.	3.	By Cash, at 25s.	100	125	—	—	
	20.	By Cash, at 25s. 6d.	100	255	—	—	
Mar.	6.	By Cyder, in barter, at 25s.	50	62	10	—	
	21.	By Cash, at 24s. 6d.	100	122	10	—	
	—	By J. Barneveldt, at 22s. 6d.	800	900	—	—	
	27.	By Cash, for a debenture, per J.	—	95	—	—	
July	1.	By Cash, at 25s.	350	437	10	—	
Aug.	15.	By Voyage to Hamburgh, at 25s.	200	250	—	—	
Oct.	4.	By Voyage to Lisbon in Co. at 24s. 6d.	100	122	10	—	
Dec.	31.	By Balance accompt, at 24s.	460	552	—	—	
			2360	2922	—	—	

		Contra	Cr.				
			C.				
1772							
Jan.	14.	By Cash, at 17s. 6d.	130	113	15	—	
	23.	By Bills receivable, per J. at 17s. 10d.	100	89	3	4	
Mar.	10.	By Cash, at 17s. 11d.	10	8	19	2	
July	1.	By Cash, at 15s.	130	97	10	—	
Aug.	7.	By Cash, at 14s.	25	17	10	—	
	22.	By Bills receivable, 14s.	10	7	—	—	
Dec.	31.	By Profit and loss for loss	—	16	2	6	
	—	By Balance-accompt, at 14s.	105	73	10	—	
			510	423	10	—	

		Contra	Cr.				
			B. lb.				
1772							
Jan.	6.	By Ja. Hartley, at 2s. 5d. 3 months credit	20 3800	459	3	4	
	14.	By Cash, at 2s. 6d.	12 2280	285	—	—	
Feb.	1.	By Bills rec. to H. Aislable, at 2s. 5d. 1 q.	10 1900	231	11	3	
	20.	By Bills rec. to J. Drapier, at 2s. 5d. 2 q.	25 4750	583	17	1	
Apr.	3.	By Sundries, per J.	33 6270	760	7	10	
			100 19000	2319	19	6	

		Contra	Cr.				
1772							
June	19.	By Voyage to Barbadoes, for 30 hds. sugar, per J.	—	720	—	—	
	—	By J. Dickenson, for 10 puncheons rum, per J.	—	90	—	—	
Aug.	8.	By B. Lincoln, his accompt-current for 15 C. cotton, per J.	—	82	—	—	
Nov.	13.	By Voyage from Barbadoes, per J.	—	217	10	—	
Dec.	31.	By Balance-accompt	—	1800	—	—	
				2909	10	—	

		James Byron, master,	Contra	Cr.			
1772							
Sept.	12.	By Sundries, for profits since 1 September 1771	—	110	—	—	
Nov.	1.	By Cash, sold one-half of my share for	—	300	—	—	
	9.	By Bills receivable, for value insured, the ship being lost, p. J.	—	292	10	—	
Dec.	31.	By Profit and loss, for loss	—	97	10	—	
				800	—	—	

Dr. *House in Fleetstreet, London,*

1772					
Jan. 1.	To Stock for value	-	-	860	
				860	

Dr. *James Hartley, Cornhill,*

1772					
Jan. 1.	To Stock due by him	-	-	438	4 1
6.	To Spanish wool for 3800 lb. at 2s. 5d. 3 months credit	-	-	459	3 4
18.	To Fitzherbert and O'Haro, for my bill on them to him, p. J.	-	-	93	17 11
Feb. 28.	To Cash, paid his bills on me, per J.	-	-	350	
April 3.	To Spanish wool, for 950 lb. at 2s. 5d. 1 q. 3 months credit	-	-	115	15 7
May 25.	To Cash, paid him	-	-	300	
June 7.	To H. Valville, his acc. claret, for 3 pipes, at L. 57, 10s. 6 mo. cr.	-	-	172	10 -
Aug. 17.	To J. Fullerton, his acc. sugar, for 60 C. at 47s. 6d. 3 mo. cr.	-	-	142	70 -
Dec. 31.	To Interest-accompt for interest due by him	-	-	35	7 3
				2107	8 2
1772					
Dec. 31.	To balance of former accompt due by him	-	-	596	9 10

Dr. *James Ritchie, Glasgow,*

1772					
Jan. 1.	To Stock due by him	-	-	540	
18.	To Fitzherbert and O'Haro, for my bill on them to him, p. J.	-	-	187	15 10
Feb. 28.	To Cash, paid his bill to J. Winter, 26 ult. 30 ddt.	-	-	175	
Mar. 20.	To Cash, paid his bill to J. Darling, 17 ult. 1 mdt.	-	-	85	
28.	To Cash, paid J. Steinhoff's bill on his account, 25 Jan. 2 ufa.	-	-	76	12 -
May 18.	To Cash, paid his bill to A. Murdoch, 15 ult. 1 mdt.	-	-	300	
July 8.	To Cash, paid his bill to J. Lawton, 6 May, 60 ddt.	-	-	290	
Aug. 1.	To Sundries, for his bill on J. Benson, returned with protest	-	-	350	6 9
31.	To Cash, paid his bill to A. Stewart, 28 July, 30 ddt.	-	-	178	
Dec. 10.	To Cash, paid a bill for his honour, supra protest, per J.	-	-	300	7 6
31.	To Sundries, for interest, commission, and postages, per J.	-	-	35	8 -
				2518	2 9
1772					
Dec. 31.	To Balance of former accompt due by him	-	-	1107	7 9

Dr. *Fitzherbert and O'Haro, Dublin,*

1772						
Jan. 1.	To Stock due by them, ex. 7 per cent.	-	-	300		280 7 5
Aug. 31.	To Cash, paid their bill to L. O'Brien, 10 ddt.	-	-	312	7 4	286 11 6
Nov. 30.	To Cash, paid their bill to C. Lucas, 14 ddt.	-	-	315	15 -	289 - 3
	To Profit and Loss, for gain by exchange	-	-	-	-	9 12 1
				928	2 4	865 11 3

Dr. *Voyage to Madeira, per the Mercury, Hanaway*

1772					
Jan. 16.	To Sundries, for a cargo consigned J. Velasquez, per J.	-	-	369	13 -
-	To J. Hazard, for insurance of L. 400, at 6 gs. with policy	-	-	25	11 6
				395	4 6

		Contra	Cr.			
1772						
May 12.	By Cash, received half a year's rent	-	40	-	-	
July 6.	By Cash, from Sunfire Insurance Office	-	500	-	-	
July 8.	By Cash, for the area	-	200	-	-	
Dec. 31.	By Profit and loss, for loss	-	120	-	-	
			860	-	-	
		Contra	Cr.			
1772						
Jan. 16.	By Voyage to Madeira, for 50 pieces stuff, at 24s. 4 mo. cr.	-	60	-	-	
April 1.	By Voyage to Barbadoes, per the Swift, Turner, per J. 6 m. cr.	-	96	-	-	
2.	By Cash, to account	-	200	-	-	
6.	By Sundries, per J. 4 months credit	-	894	10	-	
25.	By J. Farmer, my accompt-current, for his bill on him, per J.	-	200	-	-	
July 30.	By P. Darceville, for a bill Lrs. 1500, per J.	-	60	8	4	
Dec. 31.	By Balance due by him to Dr. new accompt	-	596	9	10	
			2107	8	2	
1772						
Dec. 31.	By Balance-accompt	-	596	9	10	
		Contra	Cr.			
1772						
Jan. 20.	By Cash, for his bill on Hog and Kinloch, 17 Nov. 2 mdt.	-	356	8	-	
April 3.	By Cash, for fundry bills, per J.	-	404	7	-	
June 14.	By Cash, from J. Harris on his accompt	-	300	-	-	
Aug. 1.	By Bills receivable, for his bill on J. Benson, 29 June, 30 ddt.	-	350	-	-	
Dec. 31.	By Balance, due by him to Dr. new accompt	-	1107	7	9	
			2518	2	9	
1772						
Dec. 31.	By Balance-accompt	-	1107	7	9	
		Contra	Cr.			
1772						
Jan. 18.	By Sundries, for my bills on them, per J.	-	300	-	-	
Feb. 17.	By Ja. M'Morrice, for his bills on them, per J.	-	624	15	-	
Nov. 30.	By Commission and postages, per J.	-	3	7	6	
			928	2	6	
			865	11	3	
		Contra	Cr.			
1772						
May 1.	By J. Velasquez, my acc. goods for the cargo received by him	-	395	4	6	
			395	4	6	

		Dr.	Bills Receivable,			
1772						
Jan.	1.	To Stock, for sundry bills on hand, per J.	-	1045	—	—
	23.	To Alum, for bill on H. Wren, 8 mdt. per J.	-	89	3	4
Feb.	1.	To Sundries, for bill on H. Aislabe, 3 mdt. per J.	-	252	3	9
	20.	To Spanish wool, for bill on J. Drapier, 3 mdt. per J.	-	583	17	1
	22.	To B. Lincoln, his acc. tobacco, for bill on J. Garner, 6 mdt. p. J.	-	1356	5	—
Mar.	21.	To Cash, for bill on W. Blackney, 3 mdt. per J.	-	100	—	—
	29.	To Spanish salt, for J. Pemble on W. Crossbie, 2 mdt. per J.	-	20	—	—
April	3.	To Spanish wool, for bill on J. Webb, 3 mdt. per J.	-	70	13	1
June	8.	To Geo. Hay, for his bill on R. Ellis, 1 May, 2 mdt. per J.	-	187	10	—
July	24.	To Goods from Gottenburgh, for bill on A. Merrick, 6 mdt. p. J.	-	78	—	—
Aug.	1.	To J. Ritchie, for his bill on J. Benson, 29 June, 30 ddt.	-	350	—	—
	17.	To J. Fullerton, his accompt sugar, per J.	-	912	—	—
	22.	To Sundries, for bill on J. Drayton, 6 mdt. per J.	-	332	3	4
Sep.	12.	To Share of ship Diligence, for bill on J. Eyron, 3 mdt. p. J.	-	50	—	—
Oct.	7.	To Sundries, for bill on J. Garner, 2 mdt. per J.	-	315	4	—
Nov.	1.	To J. Udney, his accompt, for bill on C. Preston, 30 ddt.	-	628	4	6
	9.	To Share of ship Diligence, for bill on J. Bishop, 1 mdt.	-	292	10	—
Dec.	20.	To A. and T. Hopp, for R. Tompkins on A. Pigot, per J.	-	148	7	—
	—	To Ditto, for their bill on W. Blake, per J.	-	33	—	—
				6844	1	1
		Dr.	James Vernon, Bristol,			
1772						
Feb.	28.	To Cash, paid his bill to E. Bruce, 25 ult. 1 mdt.	-	150	—	—
Mar.	8.	To A. and T. Hopp, for my bill on them to him, per J.	-	187	10	—
Apr.	28.	To J. Almond, per J.	-	200	—	—
June	17.	To Bills of exchange, for J. Crossbie on N. Ruiter, per J.	-	92	—	3
	26.	To P. Darceville, for my bill on him, 30 ddt. Lrs. 1800, ex. 30 d.	-	75	—	—
Oct.	15.	To J. Fullerton, his accompt sugar, for 156 C. at 46s. 8d.	-	364	—	—
				1068	10	3
		Dr.	Joseph Gordoqui, Bilboa, my Accompt,			
1772						
Jan.	9.	To Cash, paid his bill to P. Vafconcello, 6 Nov. ufa.	2400/42d.	52	10	—
	20.	To Cash, for a bill remitted him, per J.	1600/41d.	34	3	4
	—	To Profit and loss, for gain by exchange	—	—	16	8
			4000	87	10	—
		Dr.	Pierre Dupont, Bourdeaux, my Accompt,			
1772						
Feb.	13.	To Ben. Lincoln, his accompt tobacco, per J.	9541. 10 30½ d.	404	3	9
			9541. 10	404	3	9

	Contra	Cr.			
1772					
Jan. 28.	By Cash, for bill on Evans and Fenton, 12 October, 1 ddt.	300	—	—	
Feb. 23.	By Sundries, for bills discounted, per J.	2192	5	10	
Mar. 18.	By Cash, for G. Byron on J. Hill, 15 Dec. 3 mdt.	585	—	—	
May 18.	By Cash, for J. Rossiter on W. Pemble, 15 Nov. 6 mdt.	160	—	—	
June 1.	By Cash, for J. Pemble on W. Crosbie, 29 March, 2 mdt.	20	—	—	
24.	By Cash, for my bill on W. Blackney, 21 March, 3 mdt.	100	—	—	
July 4.	By Cash, for G. Hay on R. Ellis, 1 May, 2 mdt. f. 3750, at 1s.	187	10	—	
Aug. 1.	By J. Ritchie, for his bill on J. Benson, returned with protest	350	—	—	
Sept. 25.	By Cash, for bill on H. Wren, 23 Jan. 8 mdt.	89	3	4	
Nov. 30.	By Sundries, for bills discounted, per J.	920	14	6	
Dec. 19.	By Sundries, for bill on J. Garner, compounded, per J.	375	4	—	
20.	By Cash, for bill on J. Parker, 17 Aug. 4 mdt.	342	—	—	
31.	By Balance-accompt	1282	3	5	
		6844	1	1	

	Contra	Cr.			
1772					
Jan. 1.	By Stock, due him	150	9	2	
Mar. 4.	By B. Lincoln, his accompt-current for a cargo, per J.	636	6	—	
Apr. 12.	By Voyage from Bristol to Barbadoes, for 300 doz. beef, p. J.	87	2	6	
15.	By Debentures, per J.	7	7	9	
Dec. 31.	By Balance-accompt	187	4	10	
		1068	10	3	

	Contra	Cr.			
1772					
Jan. 1.	By Stock, due him	Rials. Ex. 4000 42d.	87	10	—
		4000	87	10	—

	Contra	Cr.			
1772					
Jan. 1.	By Stock, due him	Lrs. st. Ex. 1575. — 30d.	65	12	6
Mar. 11.	By Cash, for my bill on him to C. D'Eon, ufa.	7966. 10 30d. 2q.	337	9	4
—	By Profit and loss, for loss by exchange	—	1	1	11
		9541. 10	404	3	9

Dr. Adrian and Th. Hopp, Amsterdam,

1772									
Feb. 4.	To Cash, paid their bill to L. Clare, 1 Jan. ufa.	f. 3090	—	284	7	2			
Mar. 2.	To Cash, paid their bill to J. Vervins, 24 ult. st.	9410	—	863	18	3			
		f. 12500	—	1148	5	5			
1772									
Mar. 20.	To J. Barneveldt, for what he has paid them, p. J.	f. 4650.11		424	18	6			
June 20.	To J. Barneveldt, for what he has paid them, p. J.	4433. 6		408	12	—			
—	To C. Meldrup, for remittance, per J.	777.15		71	13	7			
Nov. 6.	To J. Udney, my accompt, for my bill on him, ufa.	1974.13		180	—	3			
		f. 11836. 5		1085	4	4			

Dr. Bills Payable,

1772									
Apr. 19.	To Cash, paid bill to J. Priestley, 16 October, 6 mdt.	—	—	270	—	—			
June 17.	To Cash, paid bill to J. Ellis, 14 March, 3 mdt.	—	—	480	—	—			
19.	To Cash, paid bill to J. Lardbroke, 16 March, 3 mdt.	—	—	70	16	8			
July 1.	To Cash, paid bill to E. Wynne, 28 September, 9 mdt.	—	—	500	—	—			
6.	To Cash, paid bill to J. Wren, 3 April, 3 mdt.	—	—	83	6	8			
12.	To Cash, paid bill to J. Wilcoat, 10 January, 6 mdt.	—	—	156	5	—			
24.	To Cash, paid bill to J. Cooper, 21 March, 4 mdt.	—	—	56	16	8			
Sept. 9.	To Cash, paid sundry bills per J.	—	—	651	—	—			
Oct. 4.	To Cash, paid bill to J. Standart, 1 April, 6 mdt.	—	—	85	—	—			
18.	To Cash, paid sundry bills, per J.	—	—	449	12	—			
Dec. 31.	By Balance-accompt	—	—	324	12	3			
				3127	9	3			

Dr. Linen,

1772									
Jan. 10.	To Sundries, per J. at rs. 3d.	—	—	2005000	312	10	—		
Dec. 31.	To Profit and loss for gain	—	—	—	10	8	4		
				2005000	322	18	4		

Dr. John Hazard, Insurance-broker, London,

1772									
May 22.	To Port-wine, for 12 dozen at 16s.	—	—	9	12	—			
31.	To Insurance-accompt, for premiums on sundry policies, per J.	—	—	4	19	9			
June 30.	To Insurance-acco. for sundry premiums, per Insurance-book	—	—	8	18	6			
Oct. 30.	To Insurance-accompt, for sundry premiums, per ditto	—	—	36	16	—			
Nov. 30.	To Insurance-accompt, for sundry premiums, per ditto	—	—	43	12	6			
Dec. 31.	To Cash, in full	—	—	64	2	6			
				167	15	3			

	my Account,	Contra	Cr.			
1772						
Jan. 1.	By Stock, due them at 22d.	-	f. 12500 —	1145	16	8
Mar. 2.	By Profit and loss, for loss by exchange	-	—	2	8	9
			f. 12500 —	1148	5	5
1772						
Mar. 8.	By Ja. Vernon, for my bill on them to him, per J.	-	f. 2000 —	187	10	—
June 3.	By Cash, for their bill on H. Van Sittart, per J.	-	2650. 11	241	17	11
8.	By Geo. Hay, for his bill on them, per J.	-	2044. 17	185	6	3
20.	By Cash, for a bill discounted, per J.	-	3166. 4	286	6	5
Dec. 20.	By Bills receivable, per J.	-	1548. —	148	7	—
—	By Commission and postages, per J.	-	64. 13	—	—	—
—	By Bills receivable, for bill on W. Blake, per J.	-	362. —	33	—	—
—	By Profit and loss, for loss by exchange	-	—	2	16	9
			f. 11836. 5	1085	4	4

	Contra	Cr.			
1772					
Jan. 1.	By Stock, for fundry bills, per J.	-	770	—	—
10.	By Linen, for my bill to J. Wilcoat, 6 mdt. per J.	-	156	5	—
16.	By Voyage to Madeira, for bill to J. Hawkins, 9 mdt. per J.	-	74	12	—
Mar. 6.	By Cyder, for bill to J. Harman, 6 mdt. per J.	-	75	—	—
14.	By Barley, for bill to J. Ellis, 3 mdt. per J.	-	480	—	—
16.	By Spanish salt, for bill to J. Ladbroke, 3 mdt. per J.	-	70	16	8
21.	By Adv. to Newfoundl. fishery, for bill to J. Cooper, 4 mdt. p. J.	-	56	16	8
Apr. 1.	By Voyage to Barbadoes, per the Swift, for fundry bills, per J.	-	174	17	3
3.	By J. Dickenson, for bill to J. Wren, 3 mdt. per J.	-	83	6	8
May 6.	By Voyage to Constantinople, for bill to J. Clive, 9 mdt. per J.	-	98	15	—
—	By J. Udney, for bill to S. Hodgson, 4 mdt. per J.	-	576	—	—
Aug. 15.	By Voyage to Hamburgh, for bill to W. Bakewell, 2 mdt. p. J.	-	375	—	—
Oct. 4.	By Voyage to Lisbon in Co. for bill to J. Hawkins, 3 mdt. p. J.	-	136	—	—
			3127	9	3

	Contra	Cr.			
1772					
Jan. 16.	By Voyage to Madeira, at 1s. 3d.	-	76 1900	118	15
20.	By Cash, at 1s. 4d.	-	12 300	20	—
Feb. 1.	By Bills rec. to H. Aislabie, p. bill, 3 mdt. at 1s. 4d. 2 q.	-	12 300	20	12
April 1.	By Voyage to Barbadoes, per the Swift, at 1s. 3d.	-	30 750	46	17
3.	By J. Dickenson, per the Polly, Beaton, at 1s. 4d.	-	20 500	33	6
18.	By Cash, at 1s. 4d.	-	50 1250	83	6
			200 5000	322	18
				4	—

	Contra	Cr.			
1772					
Jan. 16.	By Voyage to Madeira, for insurance of L. 400, per J.	-	25	11	6
Feb. 13.	By Sundries, for insurances, per J.	-	41	3	6
May 6.	By Voyage to Constantinople, for insurance of L. 450, per J.	-	21	9	—
—	By J. Udney, for insurance of L. 600, per J.	-	28	10	9
June 19.	By Sundries, for insurance per the Liberty, Hooper, per J.	-	48	13	6
Dec. 31.	By Insurance-account, for brokerage on L. 94, at 6d. per L.	-	2	7	—
			167	15	3

<i>Dr. Interest-accompt,</i>				
1772				
Feb. 23.	To Bills receivable, for interest on bills discounted	-	43	10 6
Nov. 30.	To Bills receivable, for interest on bills discounted	-	4	16 10
Dec. 31.	To P. Darceville, for interest on his accompt	-	61	15 5
	To Profit and loss	-		
			110	19 3
<i>Dr. Benjamin Lincoln, Virginia,</i>				
1772				
Feb. 1.	To Sundries, for freight, duty, and charges, p. J.	150 126000	3382	15 -
10.	To Cash, paid charges on a cargo for Amsterdam	-	5	5 -
13.	To Cash, paid charges on a cargo for Bourdeaux	-	3	17 6
Mar. 1.	To Sundries, per J.	-	1048	12 3
		150 126000	4440	9 9
<i>Dr. Custom-house Bonds,</i>				
1772				
Feb. 24.	To Sundries, for duty on tobacco sold for home consumption		942	1 8
	To B. Lincoln, his ac. tobacco, discharged for cargoes exported		1884	3 4
			2826	5 -
<i>Dr. Jacques Barneveldt, Amsterdam,</i>				
1772				
Feb. 10.	To B. Lincoln, his accompt of tobacco, per J.	-	415	12 6
13.	To J. Hazard, for insurance on L. 425, at 2 gs. with policy	-	9	6 -
			424	18 6
1772				
Mar. 23.	To Sundries, for a cargo barley, with charges, per J.	-	908	12 -
<i>Dr. Voyage from Cork to Barbadoes,</i>				
1772				
Feb. 13.	To J. McMorice, for a cargo provif. consigned D. Mason, p. J.		583	17 6
	To J. Hazard, for insurance of L. 600, at 5 gs. with policy		31	17 6
			615	15 -
<i>Dr. James McMorice, Cork,</i>				
1772				
Feb. 17.	To Fitzherb. & O'Haro, for his bills on them, p. J.	Irish. 624.15 - ex. 7	583	17 6
<i>Dr. Muslins,</i>				
1772				
Feb. 15.	To Cash, at 5s.	P. Yds. 30 600	150	- -
Dec. 31.	To Profit and loss, for gain	-	5	- -
		30 600	155	- -

	Contra	Cr.			
1772					
Jan. 28.	By Cash, for interest on Evans and Fenton's bill	-	4	8	9
Mar. 1.	By B. Lincoln, his acc. tobacco for disc. on J. Garner's bill, p. J.	-	33	18	-
Nov. 1.	By J. Udney, his accompt-current, for 3 months interest	-	7	15	-
Dec. 31.	By J. Ritchie, for interest due by him	-	29	10	3
-	By J. Hartley, for interest due by him	-	35	7	3
			110	19	3

	his Accompt Tobacco,	Contra	Cr.			
1772			H. lb.			
Feb. 10.	By Jacques Barneveldt, per J. at 2d. 3-eighths	50	42000	415	12	6
13.	By Pierre Dupont, per J.	50	42000	404	3	9
22.	By Bills rec. to J. Garner, per bill, 6 mdt. at 7d. 3q.	50	42000	1356	5	-
24.	By Custom-house bonds, for abatement, p. J.	-	-	117	15	2
-	By Ditto, discharged by cargoes exported, per J.	-	-	1884	3	4
-	By Cash, received back old subsidy, per J.	-	-	262	10	-
		150	126000	4440	9	9

	Contra	Cr.			
1772					
Feb. 1.	By B. Lincoln, his accompt tobacco, for bonded duties	-	2826	5	-
			2826	5	-

	his Accompt,	Contra	Cr.			
1772						
Mar. 10.	By A. and Th. Hopp, paid them by him, per J.	-	424	18	6	-
1772						
May 18.	By Cash, from J. Hill on his accompt	-	500	-	-	-
June 20.	By A. and Th. Hopp, paid them by him, per J.	-	408	12	-	-
			908	12	-	-

	per the Dolphin, Fitzpatrick,	Contra	Cr.			
1772						
June 19.	By D. Mafon, my accompt goods for the cargo arrived	-	615	15	-	-
			615	15	-	-

	Contra	Cr.			
1772					
Feb. 13.	By Voyage from Cork to Barbadoes, p. J.	Irish. ex. 624.15 - 7	583	17	6

	Contra	Cr.			
1772					
April 1.	By Voyage, per the Swift, at 5s.	P. Yds 20 400	100	-	-
May 25.	By Cash, at 5s. 6d.	10 200	55	-	-
		30 600	155	-	-

<i>Dr.</i>		<i>Charges Merchandize,</i>		
1772				
Mar. 31.	To Cash, paid small charges for 3 months	-	12	7 6
June 30.	To Cash, paid small charges for 3 months	-	5	3 4
Sep. 30.	To Cash, paid small charges for 3 months	-	3	5 -
Dec. 31.	To Cash, paid small charges for 3 months	-	12	12 -
			33	7 10
<i>Dr.</i>		<i>Insurance of Debts,</i>		
1772				
Dec. 19.	To Bills receivable, for loss in J. Garner's bill per J.	-	70	10 -
			70	10 -
<i>Dr.</i>		<i>Commission Account,</i>		
1772				
Dec. 31.	To Profit and loss	-	156	4 11
			156	4 11
<i>Dr.</i>		<i>Benjamin Lincoln, Virginia,</i>		
1772				
Mar. 4.	To Sundries, for a cargo from Bristol, per J.	-	642	12 -
20.	To Cash, paid his bill to J. Stone, 30 dit.	-	300	- -
Aug. 8.	To Providence plantation, for 15 C. cotton, per J.	-	82	- -
Dec. 31.	To Balance-account	-	6	16 7
			1031	8 7
<i>Dr.</i>		<i>Cyder,</i>		
1772				
Mar. 6.	To Bills payable, per J. at 7s. 6d.	-	200	75 -
-	To Sundries, per J. at 8s.	-	300	120 -
Dec. 31.	To Profit and loss, for gain	-	-	8 15 4
			500	203 15 4
<i>Dr.</i>		<i>Voyage to Barbadoes, per the Swift, Turner,</i>		
1772				
April 1.	To Sundries, for a cargo consigned D. Mason, per J.	-	540	4 9

	Contra	Cr.			
1772					
Mar. 1.	By B. Lincoln, his acc. tobacco, for cellar-rent and incidents		6	10	—
June 29.	By Henry Valville, his acc. claret for cellar-rent and charges		4	4	7
Oct. 15.	By J. Fullerton, his acc. sugar, for cellar-rent and charges		3	13	10
Dec. 31.	By James Ritchie, for postages		—	13	4
—	By Profit and loss		18	6	1
			33	7	10

	Contra	Cr.			
1772					
Mar. 1.	By B. Lincoln, his accmpt tobacco, for inf. of L. 2176, per J.		27	4	—
Oct. 15.	By J. Fullerton, his accmpt debts, for inf. of L. 1984, per J.		29	15	2
Dec. 31.	By Profit and loss		13	10	10
			70	10	—

	Contra	Cr.			
1772					
Mar. 1.	By B. Lincoln, his acc. tobacco, for com. on 150 hds. at 7s. 6d.		56	5	—
4.	By B. Lincoln, his ac. cur. for com. on a cargo from Bristol, p. J.		6	6	—
May 6.	By J. Udney, for com. on L. 577 : 10, at 2 one-half per cent.		14	8	9
June 29.	By H. Valville, his ac. claret, for com. on L. 1736.5, at 2 per cent.		34	14	6
Oct. 15.	To J. Fullerton, his ac. sugar, for com. on L. 1984, at 2 per cent.		39	13	7
Dec. 31.	To J. Ritchie, for com. on L. 1943, at one-fourth per cent.		4	17	1
			156	4	11

	his Accmpt-current,	Contra	Cr.			
1772						
Mar. 1.	By B. Lincoln, his accmpt tobacco, for nett proceeds		924	15	3	
Nov. 13.	By Providence plantation, for a cargo provisions		106	13	4	
			1031	8	7	

	Contra	Cr.			
1772					
Mar. 21.	By Cash, at 8s.	Calks.	100	40	—
Apr. 10.	By J. Almond, at 8s.		15	6	—
18.	By Cash, at 8s. 2d.		50	20	8
May 25.	By Cash, at 8s. 6d.		50	21	5
Aug. 22.	By Bills receivable, at 8s. 4d. per J.		100	41	13
25.	By Cash, at 8s. 2d.		100	40	16
Oct. 7.	By Bills receivable, at 8s. per J.		83	33	4
—	By Proper expences		1	—	8
—	Spoiled		1	—	—
			500	203	15

	Contra	Cr.			
1772					
Aug. 8.	By D. Mafon, my accmpt goods, for the cargo rec. by him		540	4	9

Dr. Ship Liberty, and Voyage from New York,

1772					
Mar. 10.	To J. Dickenson, for ship and cargo, per J.	-	843	15	-
June 19.	To D. Mafon, my accmpt-current, for charges paid by him	-	4	6	-
-	To J. Hazard, for insurance of L. 400, per J.	-	16	19	9
July 24.	To Will. Hooper, for charges	-	215	-	-
Dec. 31.	To Profit and loss, for gain	-	160	9	3
			1240	10	-

Dr. James Dickenson, New York, my Acc. current,

1772					
Apr. 3.	To Sundries, for linens, per the Polly Beatson, p. J.	278 11 2	174	2	-
June 19.	To Sundries, for rum, per the Thetis, per J.	576 - -	360	-	-
29.	To Cash, paid his bill to D. De Berdt, 60 dft.	400 - -	250	-	-
Nov. 13.	To D. Mafon, my acc. current, for his bill on him	195 8 10	120	12	10
Dec. 31.	To Profit and loss, for gain by exchange	-	1	10	2
		1450 - -	906	5	-

Dr. Spanish Salt,

1772					
Mar. 16.	To Bills payable, from J. Lardbroke, per bill, 3 mdt. p. J.	1000	70	16	8
Dec. 31.	To Profit and loss, for gain	-	1	-	10
		1000	71	17	6

Dr. Adventure to Newfoundland Fishery,

1772					
Mar. 21.	To Sundries, per J.	-	92	5	-
Sept. 1.	To Geo. Hardie, for expences of fishery	-	78	-	-
Dec. 19.	To Geo. Hardie, for 8 months freight, at L. 25	-	200	-	-
31.	To Profit and loss, for gain	-	16	10	-
			386	15	-

Dr. Geo. Hardie, master of the Grampus,

1772					
Mar. 21.	To Cash, advanced him	-	63	-	-
Sept. 1.	To J. Dickenson, for his bill on him, per J.	-	62	10	-
Dec. 1.	To F. Pizoni, my accmpt-current, received by him from him	-	85	-	-
19.	To Cash, in full	-	67	10	-
			278	-	-

Dr. Goods Receivable,

1772					
Mar. 25.	To Tho. Smith, for 10 tons alum, per J.	-	160	-	-
July 6.	To A. Young, for 2 tons hops, del. 30 Nov. at L. 6 : 5, per cwt.	-	250	-	-
Aug. 3.	To A. Young, for 1000 qrs. barley, del. 1 Feb. at 24s.	-	1200	-	-
			1610	-	-

	<i>Contra</i>	<i>Cr.</i>			
1772					
June 19.	By Sundries, for the cargo lumber, per J.	-	508	-	-
July 24.	By Sundries, for freight of 100 hds. sugar, at 25s.	-	125	-	-
	By Will. Hooper, for freight of 150 hds. sugar, at 25s.	-	187	10	-
Sept. 28.	By Cash, sold the ship for	-	420	-	-
			1240	10	-

	<i>Contra</i>	<i>Cr.</i>			
1772					
Mar. 10.	By Ship Liberty, &c. per J.	-	1350	-	-
Sept. 1.	By Geo. Hardie, for his bill on him, per J.	-	100	-	-
			1450	-	-
			906	5	-

	<i>Contra</i>	<i>Cr.</i>			
1772					
Mar. 21.	By Adventure to Newfoundland fishery, per J. at 1s. 5d.	500	35	8	4
29.	By Sundries, per J. at 1s. 5d. 2 q.	500	36	9	2
		1000	71	17	6

	<i>Contra</i>	<i>Cr.</i>			
1772					
Dec. 1.	By F. Pizoni, my accompt debts, for nett proceeds, per J.	-	386	15	-
			386	15	-

	<i>Contra</i>	<i>Cr.</i>			
1772					
Sept. 1.	By Adventure to Newfoundland fishery, for expences	-	78	-	-
Dec. 19.	By Adv. to Newfoundl. fishery, for 8 months freight, at L. 25	-	200	-	-
			278	-	-

	<i>Contra</i>	<i>Cr.</i>			
1772					
May 12.	By Alum, received 10 tons from T. Smith, at L. 16	-	160	-	-
Sept. 25.	By A. Young, for the bargain hops retracted	-	250	-	-
Nov. 18.	By Barley, for 500 qrs. from A. Young, at 24s.	-	600	-	-
Dec. 31.	By Balance-accompt, for 500 qu. barley, not delivered, at 24s.	-	600	-	-
			1610	-	-

Dr. Thomas Smith, Newcastle,

1772									
Apr. 3.	To Cash, paid him in part	-	-	-	60	-	-	-	-
May 18.	To Cash, paid his bill to J. Perryman, ft.	-	-	-	100	-	-	-	-
Aug. 11.	To Cash, paid his bill to Surtees and Burdon, 8 June, 2 mdt.	-	-	-	231	12	-	-	-
					591	12	-	-	-

Dr. Proper Expences,

1772									
Mar. 31.	To Cash, for 3 months expences	-	-	-	70	-	-	-	-
May 22.	To Port-wine, for 10 dozen, at 15s. 6d.	-	-	-	7	15	-	-	-
June 30.	To Cash, for 3 months expences	-	-	-	90	-	-	-	-
Sept. 30.	To Cash, for 3 months expences	-	-	-	100	-	-	-	-
Oct. 7.	To Cyder, for 1 cask	-	-	-	-	8	-	-	-
Dec. 31.	To Cash, for 3 months expences	-	-	-	170	-	-	-	-
					438	3	-	-	-

Dr. Henry Valville, Bourdeaux,

1772									
Apr. 5.	To Cash, paid freight, duty, and charges, per J. on	-	-	P. 30	1045	10	-	-	-
June 29.	To Sundries, per J.	-	-	-	690	15	-	-	-
					30	1736	5	-	-

Dr. Port-wine,

1772									
April 6.	To J. Hartley, at L. 32 : 12s. 4 months credit	20	-	-	652	-	-	-	-
22.	To Cash, pd. corks and char. at bottling, 2 pipes into	-	112	3	12	3	9	-	-
Dec. 31.	To Profit and loss, for gain	-	-	-	38	14	9	-	-
		20	112	3	702	18	6	-	-

Dr. Ja. Almond, vintner, Bishopgate-street,

1772									
Apr. 10.	To Sundries, per J.	-	-	-	471	15	-	-	-
1772									
May 22.	To Port-wine, for 45 dozen, at 15s. 6d.	-	-	-	34	17	6	-	-

Dr. Voyage from Bristol to Barbadoes,

1772									
Apr. 12.	To James Vernon, for 300 dozen beer, per J.	-	-	-	87	2	6	-	-
					87	2	6	-	-

	Contra	Cr.			
1772					
Mar. 25.	By Goods receivable, for 10 tons alum, per J.	-	160	-	-
May 6.	By Voy. to Constantinople, for 12 fadders lead, at L. 12 : 16s.	-	153	12	-
8.	By Voyage from Newcastle to the Baltic, for 50 ch. coals, per J.	-	78	-	-
			391	12	-

	Contra	Cr.			
1772					
Dec. 31.	By Profit and loss	-	438	3	-
			438	3	-

	his Account Claret,	Contra	Cr.			
1772						
Apr. 10.	By J. Almond, at L. 58 : 10s.	-	5	292	10	-
18.	By Cash, at L. 58	-	5	290	-	-
May 4.	By Cash, per J.	-	10	576	10	-
25.	By Cash, at L. 58 : 5s.	-	3	174	15	-
June 7.	By J. Hartley, at L. 57 : 10s.	-	3	172	10	-
29.	By Claret, at L. 57 : 10s.	-	4	230	-	-
			30	1736	5	-

	Contra	Cr.				
1772						
Apr. 10.	By J. Almond, at L. 34 : 13s.	-	5	173	5	-
22.	By 2 pipes bottled	-	2	-	-	-
May 22.	By Sundries, per J.	-	87	67	14	6
25.	By Cash, at L. 35.	-	2	70	-	-
July 16.	By Cash, at L. 34.	-	5	170	-	-
Aug. 7.	By Cash, at L. 33 : 10s. at 15s. 4d.	-	2	76	4	-
25.	By Cash, at L. 34.	-	2	68	-	-
Dec. 31.	By Balance-account, at L. 34, at 15s.	-	2	77	15	-
	Broken	-	3	-	-	-
			20	112	3	6
				702	18	6

	Contra	Cr.				
1772						
Apr. 25.	By J. Farmer, his account-current, for his bill on him, per J.	-	271	15	-	-
28.	By J. Vernon, per J.	-	200	-	-	-
			471	15	-	-
1772						
Dec. 31.	By Balance-account	-	34	17	6	-

	per the Mermaid, Jackson,	Contra	Cr.			
1772						
Apr. 15.	By Debentures, per J.	-	3	13	11	-
Aug. 8.	By D. Mafon, my account goods, for the cargo rec. by him	-	83	8	7	-
			87	2	6	-

		Dr.	Debentures,			
1772						
Apr. 15.		To Sundries, for a glass debenture, L. 11 : 13 : 4, per J.		11	1	8
May 25.		To Voyage from Kingston to Amsterdam, per J.		108	6	—
				119	7	8
		Dr.	James Farmer, Kingston,			
1772						
Apr. 22.		To Ditto, my accompt-current, per J.	wheat 350 barley 529	1394	17	9
			350 529	1394	17	9
		Dr.	James Farmer, Kingston,			
1772						
Apr. 25.		To Sundries, for his bills, per J.		471	15	—
May 10.		To Cash, paid his bill to J. Richards, 27 April, 10 ddt.		400	—	—
18.		To Cash, paid his bill to B. Allan, 3 ddt.		200	—	—
July 8.		To Cash, paid his bill to J. Husband, 5 May, 2 mdr.		351	7	—
				1423	2	—
		Dr.	J. Velasquez, Madeira, my Accompt of Goods,			
1772						
May 1.		To Voy. to Madeira, for the cargo per the Mercury, Hanway		395	4	6
Dec. 31.		To Profit and loss, for gain		55	—	8
				450	5	2
		Dr.	Voyage from Madeira to Barbadoes,			
1772						
May 1.		To J. Velasquez, my acc. cur. for a cargo Madeira-wine, p. J.		543	1	8
Aug. 8.		To D. Mafon, my accompt-current, for charges		76	14	—
Dec. 31.		To Profit and loss, for gain		40	17	8
				660	13	4
		Dr.	J. Velasquez, Madeira, my Accompt-current,			
1772						
Oct. 1.		To Ditto, my accompt goods, for nett proceeds	milrees. 1625	450	5	2
		To F. Brago, for his bill on him, ufa. per J.	335	92	16	6
			1960	543	1	8
		Dr.	Voyage to Constantinople, per the Fortunate, Allan,			
1772						
May 6.		To Sundries, for a cargo consigned J. Udney, per J.		457	8	6
				457	8	6

		Contra	Cr.			
1772						
June 12.	By Cash, for a glass debenture, L. 11 : 13 : 4	-	-	11	-	-
Dec. 31.	By Profit and loss	-	-	108	6	8
-	By Balance-accompt	-	-	119	7	3
		my Accompt of Corn,	Contra	Cr.		
1772						
May 20.	By Voyage from Kingston to Amsterdam, per J.	350	212	1029	14	-
22.	By Barley, received per the Industry, Thomson	-	317	365	3	9
		350	529	1394	17	9
		my Accompt-current,	Contra	Cr.		
1772						
Apr. 22.	By Ditto, my accompt corn, per J.	-	-	1394	17	9
May 20.	By Voy. from Kingston to Amsterdam for com. and char. p. J.	-	-	17	9	-
22.	By Barley, for com. and charges, per J.	-	-	10	15	3
				1423	2	-
		Contra	Cr.			
1772						
Oct. 1.	By Ditto, my accompt-current, for nett proceeds	-	-	450	5	2
				450	5	2
		per the Mercury, Hanway,	Contra	Cr.		
1772						
Aug. 8.	By Sundries, per J.	-	-	660	13	4
				660	13	4
		Contra	Cr.			
1772						
May 1.	By Voyage from Madeira to Barbadoes, for wine, p. J.	-	milrees. 1960	543	1	8
			1960	543	1	8
		Contra	Cr.			
1772						
Nov. 1.	By J. Udney, my accompt-current, for nett proceeds, per J.	-	-	418	2	6
Dec. 31.	By Profit and loss, for loss	-	-	39	6	-
				457	8	6
		3 1				

<i>Dr. J. Udney, Constantinople, his Account,</i>					
1772					
May 6.	To Sundries, for 20 hds. sugar, with charges, per J.	-	620	9	6
Nov. 1.	To Interest-account, for 3 months interest	-	7	15	-
			628	4	6
<i>Dr. Voyage from Newcastle to the Baltic, per the</i>					
1772					
May 8.	To Thomas Smith, for a cargo coals, per invoice	-	78	-	-
			78	-	-
<i>Dr. Voyage from Kingston to Amsterdam, per the</i>					
1772					
May 20.	To Sundries, per J.	-	1047	3	-
Dec. 31.	To Profit and loss, for gain	-	304	15	-
			1351	18	-
<i>Dr. Insurance-account,</i>					
1772					
Nov. 22.	To Cash, paid loss of L. 70 on the Norfolk, disc. 2 per cent.	-	68	12	-
Dec. 31.	To J. Hazard, for brokerage on L. 94, at 6d. per L.	-	2	7	-
	To Profit and loss, for gain	-	23	1	9
			94	-	9
<i>Dr. Bills of Exchange,</i>					
1772					
June 5.	To Cash, for fundry bills, per J.	-	452	15	6
Dec. 31.	To Profit and loss, for gain	-	3	2	6
			455	18	-
<i>Dr. George Hay, Dantzick, my Account,</i>					
1772					
June 8.	To A. and T. Hopp, for his bill on them, per J.	Polish. f. 3750	185	6	3
Dec. 31.	To Profit and loss, for gain by exchange	-	2	3	9
		3750	187	10	-
<i>Dr. Christian Meldrup, Copenhagen, my Account</i>					
1772					
June 18.	To Voyage from Newcastle, for nett proceeds, p. J.	Rixdollars. 336	71	8	-
Dec. 31.	To Profit and loss, for gain by exchange	-	-	5	7
		336	71	13	7
<i>Dr. William Hooper, master of the Liberty,</i>					
1772					
June 19.	To D. Mason, my account-current, advanced by him	-	33	6	8
July 24.	To Ship Liberty, for freight of 150 hds. sugar, at 25s.	-	187	10	-
			220	16	8

		Contra	Cr.			
1772	Nov. 1.	By Bills receivable, for his bill on C. Preston, 30 dft.	-	628	4	6
				628	4	6
		<i>Ifis, Willis,</i>	Contra	Cr.		
1772	June 18.	By C. Meldrap, my accompt-current, for nett proceeds, per J.	-	71	8	-
	Dec. 31.	By Profit and loss, for loss	-	6	12	-
				78	-	-
		<i>Generous, Dodson,</i>	Contra	Cr.		
1772	May 25.	By Debentures, per J.	-	108	6	-
	Aug. 3.	By J. Barneveldt, my accompt debts, for nett proceeds	-	1243	12	-
				1351	18	-
		Contra	Cr.			
1772	May 31.	By J. Hazard, for sundry premiums, per J.	-	4	19	9
	June 30.	By J. Hazard, for sundry premiums, per Insurance-book	-	8	18	6
	Oct. 31.	By J. Hazard, for sundry premiums, per Insurance-book	-	36	10	-
	Nov. 30.	By J. Hazard, for sundry premiums, per Insurance-book	-	43	12	6
				94	-	9
		Contra	Cr.			
1772	June 12.	By Cash, for B. Baker on A. Pinto, per J.	-	281	5	-
	17.	By J. Vernon, for J. Crosbie on N. Ruiter, per J.	-	92	-	3
	29.	By Henry Valville, his accompt-current, per J.	-	82	12	9
				455	18	-
		Contra	Cr.			
1772	June 8.	By Bills receivable, for bill on R. Ellis, per J.	-	Polish.		
				f. 3750	187	10
				3750	187	10
		current,	Contra	Cr.		
1772	June 20.	By A. and T. Hoppa, for remit. by him to them, p. J.	-	Rixdollars		
				336	71	13
				336	71	13
		Contra	Cr.			
1772	July 24.	By Ship Liberty, for charges	-	215	-	-
	Nov. 22.	By Cash, in full	-	5	16	8
				220	16	8

Dr. David Mason, Barbadoes, my Account

1772					
June 19.	To Sundries, for the cargo per the Dolphin, with charges, p. J.	659	1	8	
Aug. 8.	To Sundries, for the cargoes per the Swift and Mermaid, p. J.	623	13	4	
—	To Ditto, my account-current, for charges on above cargoes	65	18	—	
Nov. 13.	To Ditto, my account debts, for a desperate debt	40	—	—	
—	To Ditto, my account-current, for charges	32	—	—	
Dec. 31.	To Profit and loss, for gain	122	5	—	
		1542	18	—	

Dr. David Mason, Barbadoes,

1772					
June 19.	To Ship Liberty, &c. for ready money saleslumber	432	—	—	
Aug. 8.	To Ditto, my acc. goods, for ready money sales	765	18	—	
—	To Voyage from Madeira, for ditto	567	—	—	
Nov. 13.	To Ditto, my acc. goods, for ready money sales	245	—	—	
—	To Ditto, my account debts, for payments	367	10	—	
		2377	8	—	
		1584	18	18	

Dr. David Mason, Barbadoes, my Account,

1772					
June 19.	To Ship Liberty, &c. for lumber sold on credit	210	—	—	
Aug. 8.	To Ditto, my account goods, for sales on credit	369	9	—	
—	To Voyage from Madeira, for ditto	424	—	—	
Nov. 13.	To Ditto, my account goods, for ditto	218	—	—	
		1221	9	—	
		814	6	—	

Dr. Voyage from Barbadoes, per the Liberty,

1772					
June 19.	To Providence plantation, for 30 hds. sugar, per J.	720	—	—	
—	To J. Hazard, for insurance of L. 750, per J.	31	13	9	
		751	13	9	

Dr. Philip Darceville, Paris, Exchange-account,

1772					
July 3.	To Cash, for a remittance, per J.	4000	—	29½	
30.	To J. Hartley, for a bill, per J.	1500	—	29	
Sept. 28.	To Cash, pd. his bill to J. Bougainville, p. J.	6000	—	30	
Dec. 7.	To Cash, for a bill remitted him, per J.	3240	—	29¾	
31.	To Profit and loss, for my half share gain	—	—	7	
—	To Balance due him to Cr. new account	5404	14	29	
		20144	14	—	
		832	18	8	
1772					
Dec. 31.	To an article replaced from former account	3240	—	29¾	
—	To Balance-account	2164	14	—	
		5404	14	—	
		217	13	9	

		<i>of Goods,</i>	<i>Contra</i>	<i>Cr.</i>			
1772	Aug. 8.	By Sundries, for sales, per J.	-	-	870	18	-
	Nov. 13.	By Sundries, for sales, per J.	-	-	538	13	4
	Dec. 31.	By Balance-accompt	-	-	133	6	8
					1542	18	-
		<i>my Accompt-current,</i>	<i>Contra</i>	<i>Cr.</i>			
1772	June 19.	By Ditto, my accompt goods, for charges, per J.	65	—	43	6	8
	—	By Sundries, per J.	56	9	37	12	8
	—	By J. Dickenfon, for 30 puncheons rum, per J.	405	—	270	—	—
	Aug. 8.	By Sundries, for charges on 3 cargoes, per J.	213	18	142	12	—
	Nov. 13.	By J. Dickenfon, for his bill on him, per J.	180	19 3	120	12	10
	—	By Sundries, for charges on plantation and goods	143	12	954	8	—
	Dec. 31.	By Balance-accompt	24	9 9	16	6	6
				2377 8	1584	18	8
		<i>of Debts,</i>	<i>Contra</i>	<i>Cr.</i>			
1772	Nov. 13.	By Ditto, my accompt-current, for payments	367	10 —	245	—	—
	—	By Ditto, my accompt goods, for a desperate debt	60	—	40	—	—
	Dec. 31.	By Balance-accompt	793	19 —	529	6	—
				1221 9	814	6	—
		<i>Hooper,</i>	<i>Contra</i>	<i>Cr.</i>			
1772	July 18.	By Sugar, for the cargo received	-	-	751	13	9
					751	13	9
		<i>Contra</i>	<i>Cr.</i>				
1772	June 26	By Sundries, for my bills on him, per J.	5000	—	30 d.	208	6 8
	Aug. 19.	By Cash, for my bills on him, per J.	8100	—	—	336	10 2
	Sept. 9.	By Cash, for my bill on him to J. Hart, p. J.	3600	—	29 $\frac{7}{8}$	149	7 6
	Dec. 31.	By Interest-accompt, for interest	18	10	—	4	16 10
	—	By his half-share gain, &c. per J.	186	4	—	—	—
	—	By an outstading bill replaced	3240	—	29 $\frac{3}{4}$	133	17 6
				20144 14	—	832	18 8
1772	Dec. 31.	By Balance of former accompt due him	5404	14 29	217	13	9
				5404 14	—	217	13 9

		<i>Dr. Claret,</i>				
1772			Pipes.			
June 29.	To H. Valville, his accmpt claret, at L. 57 : 10s.	4	230	—	—	—
Dec. 31.	To Profit and loss	—	1	—	—	—
		4	231	—	—	—
		<i>Dr. Henry Valville, Bourdeaux,</i>				
1772						
June 29.	By Bills of exchange, for H. Johnson on W. Le Maitre, p. J.	82	12	9		
July 24.	By Cash, paid his bill to A. Hill, 11 current, 10 ddt.	569	3	2		
		651	15	11		
		<i>Dr. John Beaumont, Esq; of Hartfield,</i>				
1772						
July 3.	To F. Brago, for his receipt 1000 milrees, at 5s. 7d. 2 q.	281	5	—		
Aug. 5.	To J. Spendoza, for his receipt 200 pistoles, ex. 3s. 7d.	143	6	8		
Sept. 25.	To P. Pignatelli, for his receipt 500 crowns, at 6s. 1d.	152	1	8		
		576	13	4		
		<i>Dr. Frederick Brago, Lisbon, my Accmpt,</i>				
1772			milrees			
Aug. 19.	To Cash, paid his bill on me to C. Marriot, per J.	1005	278	9	4	
Dec. 12.	To Voyage to Lisbon in Co. for balance, per J.	860	238	5	10	
31.	To Profit and loss, for gain by exchange	—	2	15	8	
		1865	519	10	10	
		<i>Dr. Arthur Young of Fairfield, Kent,</i>				
1772						
July 8.	To Cash, paid his bill to A. Dobson, ft.	—	100	—	—	
Sep. 25.	To Goods receivable, for the bargain hops retracted	—	250	—	—	
Nov. 30.	To Cash, paid his bill to P. Nielson, 17 cur. 10 ddt.	—	450	—	—	
Dec. 12.	To Cash, in part	—	300	—	—	
31.	To Balance-accmpt	—	350	—	—	
			1450	—	—	
		<i>Dr. Goods from Gottenburgh,</i>				
1772			iron deals			
July 12.	To Sundries, per J.	T. C.	20 36	631	12	—
		20 36	631	12	—	

		Contra	Cr.			
1772			Pipes.			
July 1.	By Cash	-	1	58	-	-
Aug. 25.	By Cash, at L. 58	-	2	116	-	-
Sept. 15.	By Cash	-	1	57	-	-
			4	231	-	-
		his Accompt-current,	Contra	Cr.		
1772						
June 29.	By Ditto, his accompt claret, for nett proceeds	-		651	15	11
				651	15	11
		Contra	Cr.			
1772						
July 24.	By Cash, from W. Manley	-		300	-	-
Sept. 9.	By Cash, from ditto	-		200	-	-
Dec. 31.	By Balance-accompt	-		76	13	4
				576	13	4
		Contra	Cr.			
1772			milrees			
July 3.	By J. Beaumont, for his receipt, ex. 5s. 7d. 2 q.	-	1000	281	5	4
Aug. 5.	By J. Spendoza, for his bill on him, per J.	-	502½	139	4	8
19.	By Commiffion on 1000 milrees, at ½ per cent.	-	5			
Oct. 1.	By J. Velasquez, my ac. cur. for his bill on him, p. J.	-	335	92	16	6
Dec. 31.	By Balance-accompt, at 5s. 6½d.	-	22½	6	4	8
			1865	519	10	10
		Contra	Cr.			
1772						
July 6.	By Goods receivable, for 2 tons hops, per J.	-		250	-	-
Aug. 3.	By Ditto, for 1000 qrs. barley deliverable, 1 Feb, at 24s.	-		1200	-	-
				1450	-	-
		Contra	Cr.			
1772			iron deals			
July 16.	By Cash, at L. 18 : 10s. at L. 6 : 12s.	-	T. C.			
24.	By Bills receivable, per J. at L. 6 : 10s.	-	5 12	171	14	-
Aug. 7.	By Cash, at L. 17 : 17s.	-	- 12	78	-	-
Sept. 15.	By Cash, at L. 18, at 7s.	-	3 -	53	11	-
Nov. 1.	By Cash, at L. 17 : 5s.	-	7 12	210	-	-
Dec. 31.	By Profit and loss, for loss	-	5 -	86	5	-
			- -	32	2	-
			20 36	631	12	-

		<i>Dr. Peder Mofé, Gottenburgh, my Account,</i>				
1772				C.D.		
Oct. 9.	To J. Thornton, for his bill on him, per J.	-	17556	410	17	8
		<i>Dr. Sugar,</i>				
1772			H. Cwt.			
July 18.	To Sundries, per J.	-	30 360	839	14	3
24.	To Ship Liberty, for freight, at 25s. per hd.	-	30 -	37	10	-
			30 360	877	4	3
		<i>Dr. J. Fullerton, Barbadoes,</i>				
1772			H. Cwt.			
July 18.	To Sundries, paid duty and charges on	-	70 840	205	7	10
24.	To Ship Liberty, for freight at 25s. per hd.	-	- -	87	10	-
Oct. 15.	To Sundries, per J.	-	- -	1691	2	2
			70 840	1984	-	-
		<i>Dr. Jacques Barneveldt, Amsterdam,</i>				
1772			Ex.			
Aug. 3.	To Voy. to Amsterdam, for nett proceeds, p. J.	f. 13462	36: 1	1243	12	-
		f. 13462	-	1243	12	-
		<i>Dr. J. Spendoza, Madrid, my Account,</i>				
1772			rials ex.			
Aug. 5.	To F. Brago, for his bill on him, per J.	-	6432	139	4	8
Dec. 31.	To Profit and loss, for gain by exchange	-	-	4	2	-
			6432	143	6	8
		<i>Dr. Voyage to Hamburgh per the Fair Trader, Warren,</i>				
1772						
Aug. 15.	To Sundries, per J.	-	-	909	5	-
Dec. 31.	To Profit and loss, for gain	-	-	107	11	6
				1016	16	6
		<i>Dr. Voyage from Liverpool to Venice, per the</i>				
1772						
Sep. 18.	To Wm. Lowther, for 400 barrels salmon, with charges, p. J.	3	-	905	5	-
				905	5	-

<i>Contra</i>		<i>Cr.</i>			
		<i>C. D.</i>			
1772	July 12.	By Goods from Gottenburgh, per J. ex. 42	17556	418	—

<i>Contra</i>		<i>Cr.</i>			
		<i>H. Cwt.</i>			
1772	July 24.	By Cash, at L. 2 : 8	15 180	432	—
Aug. 7.	By Cash, at L. 2 : 7	5 60	141	—	—
15.	By Voyage to Hamburgh, at L. 2 : 7	10 120	282	—	—
Dec. 31.	By Profit and loss, for loss		22	4	3
		30 360	877	4	3

<i>his Account of Sugar,</i>		<i>Contra</i>	<i>Cr.</i>			
			<i>H. Cwt.</i>			
1772	Aug. 17.	By Sundries, per J. at 47s. 6d.	37 444	1054	10	—
22.	By Bills receivable, per J. at 47s. 3d.	10 120	283	10	—	—
Oct. 7.	By Bills receivable, per J. at 47s.	10 120	282	—	—	—
15.	By James Vernon, at 46s. 8d.	13 156	364	—	—	—
		70 840	1984	—	—	—

<i>my Account of Debts,</i>		<i>Contra</i>	<i>Cr.</i>			
			<i>ex.</i>			
1772	Aug. 17.	By Cash, for my bill on him to A. Hill, 2 ufa.	f. 3000 35 : 6	281	13	9
Oct. 20.	By R. Tompkins, my A. P. for my bill on him, p. J.	3000	278	2	6	—
Nov. 9.	By Cash, for his bill on J. Philpot, 6 ult. ufa.	7462	680	4	11	—
Dec. 31.	By Profit and loss, for loss by exchange		3	10	10	—
		13462	1243	12	—	—

<i>Contra</i>		<i>Cr.</i>			
		<i>rials. ex.</i>			
1772	Aug. 5.	By J. Beaumont, for his receipt	6400 43d.	143	6 8
		By Commission on 6400 rials, at one-half per cent.	32	—	—
		6432	143	6 8	—

<i>Contra</i>		<i>Cr.</i>			
1772	Sept. 8.	By Cash, received drawback and bounty, per J.	91	9	—
Oct. 9.	By Sundries, for nett proceeds, per J.	925	7	6	—
		1016	16	6	—

<i>Industry, Smith,</i>		<i>Contra</i>	<i>Cr.</i>			
1772	Oct. 12.	By Cash, for bounty on 400 B. salmon, at 4s. 6d.	90	—	—	—
Dec. 1.	By F. Pizoni, my account-current, for nett proceeds	754	7	6	—	—
31.	By Profit and loss, for loss	60	17	6	—	—
		3 K	905	5	—	—

<i>Dr. William Lowther, Liverpool,</i>				
1772				
Nov. 30.	To Cash, paid his bill to J. Green, 27 ult. 1 mdt.	600	—	—
Dec. 31.	To Balance-accompt	305	5	—
		905	5	—
<i>Dr. P. Pignatelli, Rome, my Accompt,</i>				
1772				
Nov. 6.	To F. Pizoni, for his bill on him, per J.	Crowns. 502½	157	— 9
		502½	157	— 9
<i>Dr. Voyage to Lisbon in Co. with A. Benson and</i>				
1772				
Oct. 4.	To Sundries, for a cargo per the True Briton, Fisher, per J.	636	14	—
Dec. 12.	To Sundries, for profit	49	2	3
		685	16	3
<i>Dr. Alex. Benson, Lombard-street,</i>				
1772				
Oct. 4.	To Ditto, his accompt in Co. for one-third of outset	212	4	8
20.	To H. Primrose, his accompt-proper, for what he has paid him	91	18	8
Dec. 12.	To Voyage to Lisbon in Co. for salt shipped on his accompt	144	1	8
—	To Cash, in full	80	7	1
		528	12	1
<i>Dr. Alex. Benson, Lombard-street,</i>				
1772				
Oct. 12.	To Ditto, his accompt-proper, for one-third bounty on barley	4	3	4
Dec. 12.	To Ditto, his accompt-proper, for one-third nett proceeds	224	8	9
		228	12	1
<i>Dr. Henry Primrose, Leadenhall-street,</i>				
1772				
Oct. 4.	To Ditto, his accompt in Co. for one-third of outset	212	4	8
<i>Dr. Henry Primrose, Leadenhall-street,</i>				
1772				
Dec. 12.	To Voyage to Lisbon in Co. for wine shipped on his accompt	290	18	9
<i>Dr. Henry Primrose, Leadenhall-street,</i>				
1772				
Oct. 12.	To Ditto, his acco. proper, for his one-third bounty on barley	4	3	4
D.c. 12.	To Ditto, his accompt-proper, for one-third nett proceeds	224	8	9
		228	12	1

		Contra	Cr.			
1772	Sept. 18.	By Voyage from Liverpool to Venice, per J.	-	905	5	-
				905	5	-
		Contra	Cr.			
1772	Sept. 25.	By J. Beaumont, for his receipt, per J.	-	500	1	8
	Nov. 6.	By Commission on 500 crowns, at $\frac{1}{2}$ per cent.	-	2 $\frac{1}{2}$		
	Dec. 31.	By Profit and loss, for loss by exchange	-	4	19	1
				502 $\frac{1}{2}$	157	9
		H. Primrose,	Contra	Cr.		
1772	Oct. 12.	By Cash, for bounty on 100 qrs. barley, at 2s. 6d.	-	12	10	-
	Dec. 12.	By Sundries, for nett proceeds, per J.	-	673	6	3
				685	16	3
		his Accompt proper,	Contra	Cr.		
1772	Oct. 4.	By Voyage to Lisbon in Co. for cloth	-	500		
	12.	By Ditto, his accompt in Co. for one-third bounty on barley	-	4	3	4
	Dec. 12.	By Ditto, his accompt in Co. for his one-third nett proceeds	-	224	8	9
				528	12	1
		his Accompt in Company,	Contra	Cr.		
1772	Oct. 4.	By Ditto, his accompt-proper, for one-third of outset	-	212	4	8
	Dec. 12.	By Voyage to Lisbon in Co. for one-third profit	-	16	7	5
				228	12	1
		his Accompt-proper,	Contra	Cr.		
1772	Oct. 12.	By Ditto, his accompt in Co. for one third bounty on barley	-	4	3	4
	20.	By Sundries, per J.	-	208		4
				212	4	8
1772	Dec. 12.	By Ditto, his accompt in Co. for one-third nett proceeds	-	224	8	9
	31.	By Balance-accompt	-	66	10	
				290	18	9
		his Accompt in Company,	Contra	Cr.		
1772	Oct. 4.	By Ditto, his accompt-proper, for his one-third of outset	-	212	4	8
	Dec. 12.	By Voyage to Lisbon in Co. for one-third profit	-	16	7	5
				228	12	1

<i>Dr. J. Thornton, Hamburg,</i>				
1772		M. Lubs.		
Oct. 9.	To Voyage to Hamburg for one-half nett proceeds	6730	462	13 9
Dec. 31.	To Profit and loss, for gain by exchange		12	7
		6730	463	6 4
<i>Dr. J. Thornton, Hamburg,</i>				
1772		M. Lubs.		
Oct. 9.	To Voy. to Hamburg, for one-half nett proceeds	6730	462	13 9
<i>Dr. J. Fullerton, Barbadoes, his Account current,</i>				
1772				
Nov. 9.	To Cash, paid his bill to A. Seton, 30 dft.	-	1000	- -
13.	To D. Mafon, my account goods, per J.	-	230	- -
Dec. 31.	To Balance-account	-	387	19 7
			1617	19 7
<i>Dr. R. Tompkins, Aldergate, my Account,</i>				
1772				
Oct. 20.	To Ditto, my account-proper, for my one-half of India goods		322	- -
Dec. 31.	To Profit and loss, for my share gain		12	8 9
			334	8 9
<i>Dr. R. Tompkins, Aldergate,</i>				
1772				
Oct. 20.	To J. Barneveldt, my account debts, for my bill on him, p. J.		278	2 6
30.	To Ditto, my account in Co. for my one-half of tea fold		162	10 -
Nov. 22.	To Ditto, my account in Co. per J.		119	8 9
			560	1 3
<i>Dr. J. Udney, Constantinople,</i>				
1772		Aspers.		
Nov. 1.	To Voy. to Constantinople, for nett proceeds, p. J.	167250	418	2 6
		167250	418	2 6
<i>Dr. Francis Pizoni, Venice,</i>				
1772		Ducats.		
Nov. 1.	To J. Udney, my acc. current, for remittance, per J.	1070	227	7 6
Dec. 1.	To Voyage from Liverpool, for nett proceeds, per J.	3550	754	7 6
		4620	981	15 -

		<i>my Accompt-current,</i>	<i>Contra</i>	<i>Cr.</i>			
1772				M. Lubs.			
Oct. 9.	By P. Mofs, for his bill on him, per J.	-	-	5976	8	410	17
25.	By Cash, for his bill on L. Goulbourn, per J.	-	-	753	8	52	8
				6730	-	463	6
							4
		<i>my Accompt of Debts,</i>	<i>Contra</i>	<i>Cr.</i>			
1772				M. Lubs.			
Dec. 31.	By Balance-accompt	-	-	6730		462	13
							9
		<i>Contra</i>		<i>Cr.</i>			
1772							
Oct. 15.	By Ditto, his accompt sugar, for nett proceeds	-	-			1617	19
							7
						1617	19
							7
		<i>in Company,</i>	<i>Contra</i>	<i>Cr.</i>			
1772							
Oct. 30.	By Ditto, my accompt-proper, for my one-half of tea fold	-	-			162	10
Nov. 22.	By Ditto, my accompt-proper, per J.	-	-			119	8
-	By Pepper, for 700 lb. at 1s. 6d.	-	-			52	10
						334	8
							9
		<i>my Accompt proper,</i>	<i>Contra</i>	<i>Cr.</i>			
1772							
Oct. 20.	By Ditto, my accompt in Co. for my one-half of India goods	-	-			322	-
30.	By Cash, for a bill on Amsterdam, per J.	-	-			140	12
Nov. 22.	By Cash, in full	-	-			97	8
						560	1
							3
		<i>my Accompt-current,</i>	<i>Contra</i>	<i>Cr.</i>			
1772				Aspers.			
Nov. 1.	By F. Pizoni, for remittance to him, per J.	-	-	99510		227	7
6.	By A. and T. Hopp, for my bill on him to them, p. J.	-	-	67740		180	-
Dec. 31.	By Profit and loss, for loss	-	-			10	14
							9
				167250		418	2
							6
		<i>my Accompt-current,</i>	<i>Contra</i>	<i>Cr.</i>			
1772				Ducats.			
Nov. 6.	By P. Pignatelli, for his bill on him on my accompt	-	-	739		157	-
Dec. 1.	By Geo. Hardie, paid him ex. 4s. 3d.	-	-	400		85	-
5.	By Cash, for my bill on him, per J.	-	-	3481		739	14
							3
				4620		981	15
							-

		<i>Dr. Voyage from Barbadoes, per the West Indian,</i>			
1772	Nov. 13.	To Providence plantation, per J.	217	10	—
		<i>Dr. Pepper,</i>			
1772	Nov. 22.	To R. Tompkins, my accompt in Co. at 1s. 6d.	lb. 700	52	10 —
		<i>Dr. Francis Pizoni, Venice,</i>			
1772	Dec. 1.	By Adv. to Newfoundland fishery, for nett proceeds	Ducats. 1820	386	15 —
		<i>Dr. Balance-accompt,</i>			
1772	Dec. 31.	To Cash		297	7 7
		To Barley, for 460 qrs. at 24s.		552	— —
		To Alum, for 105 C. at 14s.		73	10 —
		To Providence plantation, Barbadoes		1800	— —
		To J. Hartley, Cornhill		596	9 10
		To J. Ritchie, Glasgow		1107	7 9
		To Bills receivable		1282	3 5
		To James Vernon, Bristol		187	4 10
		To Goods receivable		600	— —
		To Port-wine, for 2 pipes, at L. 34	L. 68		
		13 doz. at 15s.	9 15	77	15 —
		To J. Almond, Bishopgate-street		34	17 6
		To Debentures		108	6 —
		To D. Mafon, my accompt of goods		133	6 8
		To D. Mafon, my accompt-current, L. 24 : 9 : 9, ex. 150		16	6 6
		To D. Mafon, my accompt of debts 793 : 19s. ditto		529	6 —
		To J. Beaumont of Hartfield		76	13 4
		To F. Brago, Lisbon, my accompt, M. 22½ at 5s. 6d. 1q.		6	4 8
		To H. Primrose, his accompt proper		66	10 —
		To J. Thornton, my accompt of debts, M. 6730, at 16½d.		462	13 9
		To Voyage from Barbadoes		217	10 —
		To Pepper, for 700 lb. at 1s. 6d.		52	10 —
		To F. Pizoni, my accompt of debts, 1820 ducats at 4s. 3d.		386	15 —
				8664	17 10

I N D E X.

A		I		T	
Alum -	3	Interest-accompt -	7	Thornton, J. my accompt-	
Adventure to Newfound-		Insurance of debts -	8	current -	17
land Fishery -		Insurance-accompt -	12	Thornton, J. my accompt	
Almond, J. -	10			debts -	17
B		K		Tompkins, R. my accompt	
Barley -	3			in Co. -	17
Bills receivable -	5	L		Tompkins, R. my accompt	
Bills payable -	6	Linen -	6	proper -	17
Barneveldt, J. his accompt	7	Lincoln, B. his acc. tobacco	7	V	
Bills of exchange -	12	Lincoln, B. his acc. current	8	Vernon, James -	5
Beaumont, John -	14	Lowther, William -	16	Voyage to Madeira -	4
Brago, Frederick -	14	M		Voyage from Cork to Bar	
Barneveldt, J. my acc. debts	15	McMorrice, James -	7	badoes -	7
Benfon, A. his acc. proper	16	Mullins -	7	Voyage to Barbadoes, per	
Benfon, A. his acc. in Co.	16	Meldrup, Christian -	12	the Swift -	8
Balance-accompt -	18	Mason, D. my acc. goods	13	Valville, H. his acc. claret	10
C		Mason, D. my acc. current	13	Voyage from Bristol to	
Cash -	1, 2	Mason, D. my acc. debts	13	Barbadoes -	10
Custom-house bonds -	7	Moss, P. -	15	Velasquez, J. my acc. goods	11
Charges merchandize -	8	N		Velasquez, J. my acc. cur.	11
Commission-accompt -	8			Voyage from Madeira to	
Cyder -	8	O		Barbadoes -	11
Claret -	14			Voyage to Constantinople	11
D		P		Udney, Jas. his accompt	12
Dupont, Pierre, my acco.	5	Profit and loss -	1	Voyage from Newcastle to	
Dickenfon, J. -	9	Providence plantation	3	the Baltic -	12
Debentures -	11	Proper expences -	10	Voyage from Kingston to	
Darceville, Philip -	13	Port-wine -	10	Amsterdam -	12
E		Pignatelli, P. -	16	Voyage from Barbadoes	
F		Primrose, H. his acc. prop.	16	per the Liberty -	13
Fitzherbert and O'Haro	4	Primrose, H. his acc. in Co.	16	Valville, H. his acc. current	14
Farmer, J. my acc. corn	11	Pizoni, Fran. my acc. cur.	17	Voyage to Hamburg	15
Farmer, J. my acc. current	11	Pepper -	18	Voyage from Liverpool	
Fullerton, J. his acc. sugar	15	Pizoni, Fran. my acc. debts	18	to Venice -	15
Fullerton, J. his acc. curr.	17	Q		Voyage to Lisbon in Co.	16
G				Udney, J. my accompt	17
Gordoqui, Joseph -	5	R		Voyage from Barbadoes	
Goods receivable -	9	Ritchie, James -	4	per the West Indian	18
Goods from Gottenburgh	14	S		W	
H		Stock -	1	X	
House in Fleetstreet -	4	Spanish wool -	3	Y	
Hartley, James -	4	Share of ship Diligence	3	Young, Arthur -	14
Hopp, A. and T. -	6	Ship Liberty, &c. -	9	Z	
Hazard, John -	6	Spanish salt -	15		
Hardie, George -	9	Smith, Thomas -	15		
Hay, George -	12	Sugar -	15		
Hooper, William -	12	Spendoza, J. -	15		

SETS FOR PRACTICE.

SET C. JAMES HOWSTON Glasgow, 1 January 1772.

INVENTORY. Ready money, L. 165 : 13 : 4. 8 bags cotton, $1\frac{1}{2}$ C. each, at L. 4 : 3s. per C. 40 hds. tobacco, 800 lb. each, duty paid, at 7d. per lb. One fourth share of Glenholm bleachfield, value of the whole L. 1800. William Hislop, Glasgow, owes L. 162 : 3 : 8; William Frazer, Greenock, L. 372 : 6 : 9; Bills, M. Frazer on W. Dick, 16 Nov. 3 mdt. L. 18 : 3 : 9; my bill on J. Stark, 1 October, 1 ddt. L. 30; ditto on W. Sharp, 2 Oct. 5 mdt. L. 49 : 5 : 10. Tobacco, in the hands of Francis Barrillon, Bourdeaux, value L. 240. Goods in a store on Rhappahannoc-river, Virginia, under the charge of D. Berry my storekeeper, L. 574 : 10s. Sterling; and balance due by D. Berry, L. 251 currency, ex. 50.

DEBTS. To W. Parkins and Co. London, per accmpt, L. 526, ex. $\frac{1}{2}$ per cent.; to Thistle Bank, L. 520; to A. Lindfey of Woolmot, per bond due Whitsunday last, L. 500, and interest for $\frac{1}{4}$ year, at $4\frac{1}{2}$ per cent. Bills, To W. Miller, 12 July, 9 mdt. L. 53 : 4 : 9; to D. Gray, 18 August, 8 mdt. L. 17 : 12 : 8.

TRANSACTIONS.

January 3d, sold for ready money, 10 hds. tobacco, 800 lb. each, at $7\frac{1}{2}$ d.—12th, Bought from Th. Smith, per bill, 3 mdt. 12 ps. lawn, $22\frac{1}{2}$ yards each, at 3s.; and, for ready money, 10 puncheons rum, at L. 40.—15th, Received from W. Frazer, in part, L. 245.—18th, Sold for ready money, 4 bags cotton, $1\frac{1}{2}$ C. each, at L. 4 : 14 : 6 per C.—20th, Received from W. Hislop, in part, L. 12 : 3 : 8. Paid Thistle Bank, L. 200.—24th, Bought from J. Neilson, 30 ps. lawn, 20 yds. at 2s. 6d. paid one-half, and granted bill 3 mdt. for balance.—26th, Sold J. Graham, 1 puncheon rum, at L. 43, and received in part L. 25.—28th, Shipped for Virginia, per the Prosperous Shirley, consigned D. Berry, 12 ps. lawn, $22\frac{1}{2}$ yards each, at 3s.; 12 ditto, 20 yards each, at 2s. 6d.; 3 boxes thread from W. Hislop, L. 100 : 15s.; 2 boxes shoes from Th. Cuming, per bill 2 mdt. L. 35 : 5s.; 60 ps. printed linen, from M. Swanfon, per bill 6 mdt. at 55s. Charges shipping, L. 2 : 5 : 8. Insured L. 400 on above, at J. Malcolm's office, at $5\frac{1}{2}$ gs.; policy, 5s. 6d.

February 1st, Bought from W. Pillans, shipmaster Greenock, 22 lasts herrings, at L. 9 : 9s. 4 mo. cr.; from J. Jenkins, per bill 6 mdt. 30 pieces lawn, 20 yards each, at 3s. 6d.—3d, Drawn on the Thistle Bank L. 100. Bought for ready money D. Elliot's bill on

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W.

W. Cochrane and Co. 60 ddt. L. 120, and remitted it to W. Parkins and Co. ex. $\frac{1}{2}$ per cent.—4th, Received payment of my bill on J. Stark, 1 Oct. 1 ddt. L. 30, with interest.—5th, Shipped for Madeira, per the Industry, Lyon, consigned to J. Catanach, an assortment cast iron, bought from the Carron Co. per bill 4 mdt. L. 342:3:9; 20 ps. lawn, qt. 20 yards each, at 3s. 6d.; and 10 ps. ditto, 20 yards each, at 2s. 6d. and 10 ps. ditto, instantly bought from W. Hislop, qt. 22 yards each, at 3s. 9d.; 15 lasts herrings, at L. 9:9s.; charges shipping, L. 4:4s.—12th, Received accompt sales of tobacco from P. Barillon, nett proceeds, Lrs. 5880, ex. 31d.—19th, Received payment of M. Frazer on W. Dick, 16 Nov. 3 mdt. L. 18:3:9; Sold 1 last herrings to W. Hislop, L. 10:5s. and 6 ditto for money, at L. 9:15s.—20th, Received bounty on 180 barrels herrings, at 2s. 8d. Paid the Bank L. 100. Remitted W. Parkins and Co. my bill on F. Barillon, ufance for the amount of his accompt.

March 5th, Received payment of my bill on W. Sharp, 2 Oct. 5 mdt.—6th, Shipped by order of Henry Miller, New York, per the Diligence, Benson, 10 ps. lawn, 20 yards each, at 3s. 7d.; 30 ps. linen from G. Nisbet and Co. Glasgow, 22 yards each, at 1s. 9d.; 1200 lb. leather from Tannery Co. per bill 9 mdt. at $9\frac{1}{2}$ d.; 120 prinred handkerchiefs, bought for money, at 1s. 10d.; charges L. 1:8:4; commission $2\frac{1}{2}$ —17th, Received drawback of excise on 1200 lb. leather, at 2d. per lb. Drawn on W. Nelthorp, London, to W. Parkins and Co. 60 ddt. for the amount of Henry Miller's accompt. Parkins and Co. have negotiated the bill on Barillon, at $31\frac{1}{4}$ d.—25th, Shipped for Bourdeaux, per the George, Will. Anderson, on accompt of F. Barillon, payable in London, 20 hds. tobacco, 800 each, at 2d. and 4 bags cotton, $1\frac{1}{2}$ C. each, at L. 4:10:6; charges L. 3:7:4. Insured at J. Malcolm's office, L. 170, on above, at $2\frac{1}{2}$ per cent.; policy 5s. 6d. Drawn on F. Barillon, ufa. to W. Parkins and Co. L. 100, at $\frac{1}{2}$ per cent.; and to T. Crockett, for ready money, do. for the balance.—31st, Paid bill to J. Cumming, 28th Jan. 2 mdt. D. Berry has shipped for Greenock, per the Triton, Dale, 15 hds. tobacco, 800 lb. each, at $3\frac{1}{2}$ d. currency per lb.; charges, L. 5:6:8 currency, ex. 50. Paid small charges for 3 months, L. 5:10s.; expences, L. 55.

April 1st, Bought from T. Hunter, per bill, 5 mdt. 10 hds. tobacco, qt. 103 C. 2 q. gros, tare 3 q. 7 lb. per hd. at 16s. per C. duty not paid.—2d, Ja. Willoughby, Liverpool, has purchased, on my accompt, 125 qrs. wheat, at 35s. 6d. and 108, at 36s. 4d.—3d, Drawn on Thistle Bank, L. 500. Bought from Th. Burnet, Liverpool, the sloop Peggy of that place, burthen 103 tons, at L. 5:10s. per ton. Paid in part, L. 200. Paid Ja. Willoughby's bill to Will. Meredith, St. L. 352.—11th, James Willoughby has further purchased on my accompt, 104 qrs. wheat, at 35s. 9d. and 107 barley, at 18s. 9d.—15th, Drawn on the Thistle Bank, L. 400. Paid bill to T. Smith, 12 January, 3 mdt. and to William Miller, 12 July

12 July 1771, 9 mdt.—18th, Agreed to take a half share with James Berry, Glasgow, in the sloop William, James Halley master, purchased by his order at Boston, and ready to sail on freight for St Christopher's, cost L. 678 currency, ex. 65. Paid James Berry to accompt, L. 200.—21st, Paid bill to D. Gray, 18th August 1771, 8 mdt.—27th, Paid bill to J. Nielson, 24 January, and W. Frazer's bill to M. Spence, 3 dft. L. 50.

May 1st, Received drawback of duty on 16000 lb. tobacco, exported, per the George, to Bourdeaux, at $5\frac{1}{2}$ d.; custom-house fees 6s. 8d.—10th, Received the tobacco per the Triton, Dale, and shipped the same per the Grampus, Brown, for Rotterdam, consigned to J. Van Neck; and paid freight at 18s. per hdl.; charges, L. 5 : 10s. Made insurance at J. Malcolm's office on L. 150 on above, at 3 per cent. policy, 5s. 6d.—14th, Paid the Thistle Bank, L. 300.—16th, Shipped per the North Star, Cook, for Gottenburgh, consigned to George Wiefbach, 10 hds. tobacco, qt. 800 lb. each, at $1\frac{1}{8}$ d.; 10 ditto, qt. 10682 lb. at 16s. per C.; 300 bolls malt, bought from J. Cunningham, per bill 6 mdt. at 16s. 9d.; charges at shipping, L. 4 : 10 : 5.—22d, Due A. Lindsay a half year's interest on his bond L. 500, at $4\frac{1}{2}$ per cent. Paid him a year's interest. James Willoughby has shipped my wheat and barley per the Peggy, Blinthal, for Marfeilles, consigned to Trevier and Diderot; charges shipping, L. 5 : 13 : 10; commission, 2 per cent.; and has drawn on W. Parkins and Co. 20 current, 2 mdt. L. 150 par. W. Parkins and Co. have made insurance on my accompt, by order of J. Willoughby, on L. 750, per the Peggy, at 3 gs. per cent.; commission, $\frac{1}{2}$ per cent.; policy, 7s. 6d.; ex. $\frac{1}{2}$ per cent.—31st, Borrowed from J. Gordon, per bill, 1 ddt. L. 200. Bought, for ready money, J. Trotter's bill on Trecothick and Co. 30 ddt. and remitted the same to W. Parkins and Co. L. 200, at $\frac{3}{8}$ per cent.

June 1st, Received from J. Catanach, Madeira, accompt sales of the cargo, per the Industry, Lion, nett proceeds 2538⁷/₅₀; ex. 5s. 7d. He has shipped a cargo wine to St Christophers, per said ship, on my accompt, consigned to W. Nisbet, amount, per invoice, 2874⁹²/₅₀; and has drawn on W. Parkins, 10 March, 2 ufa. for the balance, ex. with London $\frac{1}{2}$ per cent.—3d, Paid Geo. Nisbet and Co. in full, 5s. being abated.—8th, Drawn on the Thistle Bank, L. 700. Paid bill to Carron Company, 5 February. Paid W. Pilans in full. Received payment of W. Frazer, on E. Hart, 7 ult. 1 mdt. L. 135 : 15s. Lent W. Wilson, per bill, 1 ddt. L. 100.—10th, Received from Ab. Dackers, Lisbon, a cargo salt, per the Mary, Smart, qt. 1800 B.; amount, per invoice, 328⁷/₅₀, ex. 5s. 7d.—12th, Paid freight on salt, at 4d. per bushel; duty on ditto, entered for curing fish, at $1\frac{5}{8}$ d. and charges L. 3 : 5 : 8.—16th, Shipped for A. Dackers, per the Flyboat, Bell, 8 ps. lawn, 160 yds. at 2s. 7d. 60 ditto, 600 yds. bought from W. Hislop, at 2s. 8d.; charges, L. 1 : 6 : 8; commission, $2\frac{1}{2}$ per cent.—20th, W. Parkins and Co. have received payment of a debenture, transmitted them by

Ja. Willoughby, for the bounty on the corn per the Peggy, Blinthal, wheat at 5s. barley at 2s. 6d. per qr.; ex. $\frac{1}{2}$.—24th, Received payment of drawback of duty on 80000 lb. tobacco, per the North Star, at 5 $\frac{1}{2}$ d.—25th, Ja. Berry has received advice of the arrival of the ship William at St Christophers, and that the freight of the lumber is L. 185, and charges on the ship L. 80 currency, ex. 68; and that W. Nisbet has shipped, on our accompt, a cargo sugar and rum, consigned to Ja. Oliver, Boston, amount L. 1272 currency, and has drawn on W. Parkins and Co. on my accompt, 60 ddt. L. 300 Sterling. Ja. Berry has made insurance on L. 1000 value, in ship and goods, per the William, at 3 guineas policy, 5s. 6d.—28th, Drawn on W. Parkins and Co. to J. Wilton, 30 ddt. for ready money, L. 36: 15s.; ex. 1 per cent.; and to W. Bell, 60 ddt. ex. $\frac{1}{2}$; for which received ditto Bell's bill, 1 ddt. Remitted them my bill on S. Malcher, 60 ddt. for the balance due by A. Dackers, par.—30th, J. Van Neck has received and sold the tobacco per the Grampus, Brown, 4 mos. credit, nett proceeds, per accompt sales, f. 1537, at 22 $\frac{1}{2}$ d. Paid small charges for 3 months, L. 5: 5s.; expences, L. 75.

July 1st, Trevier and Diderot, Marseilles, have received the cargo per the Peggy, Blinthal, and have shipped per said ship, on my accompt, 50 casks brandy amount, per invoice, Lrs. 8236, and 5 bales silk, amount Lrs. 14376, consigned to Harvey and Freeman, London, ex. 30 $\frac{1}{2}$. Received advice from G. Weibach, Gottenburgh, that he has received the cargo per the North Star, and sold the malt, nett proceeds, per accompt sales, 12597 copper dollars, ex. 42; and that he has shipped the tobacco per the Gustavus, Moss, for Dantzick, in expectation of a better market, consigned to J. Walmoden, and paid freight and charges 735 copper dollars, (the prime cost I reckon L. 137), and remitted P. de Hondt, Amsterdam, on my accompt, his bill on J. Kempfer, 10 June, 2 mdt. for the balance, ex. 12, at 21 $\frac{1}{2}$ d. per f. W. Parkins and Co. have made insurance on L. 1000 value in goods, per the Peggy, Blinthal, at 3 gs. per cent.; policy 7s. 6d.; commission $\frac{1}{4}$ per cent.—8th, Borrowed from Merchant Co. Glasgow, 10,000 merks Scots, per bond, at 4 per cent. Paid Tho. Burnet in full, and Thistle Bank L. 200.—15th, Trevier and Diderot have sold the corn per the Peggy, Blinthal; nett proceeds, per accompt sales, Lrs. 21715; ex. 30 $\frac{1}{2}$; and have transmitted me W. Blinthal's receipt for Lrs. 624, and drawn on W. Parkins and Co. 25 ult. ufa. for the balance.—18th, Contracted with W. Fraser for 100 barrels Philadelphia flaxseed, to be delivered me on or before 1 April next, at 27s.—22d, Sold W. Hislop 400 bushels salt, at 1s. 6 $\frac{1}{2}$ d.—25th, Sold for ready money, 100 bushels salt, at 1s. 6d.—27th, Ja. Berry acquaints me that the ship William is lost on the coast of New England, but the crew and part of the cargo saved; and that James Oliver has sold what goods are recovered by sale at auction, for L. 828 currency; charges L. 172; his commission 5 per cent.; ex. 71 per cent. 31st, Paid bill to M. Swanson 28th January.

August

August 1st, Sold D. Hart, per bill 3 mdt. 300 bushels falt, at 1s. 6 $\frac{1}{2}$ d.—4th, Received payment of bill on W. Wilfon, 8th June, with interest. Paid bill to J. Jenkins, 1st February.—8th, D. Berry advises that he has received the cargo per the Prosperous, Shirley.—10th, J. Willoughby has drawn on W. Parkins and Co. on my accompt, 6 cur. 30 ddt. for the balance of his accompt par. J. Walmoden has received the tobacco per the Gustavus, and sold it on credit N. P. f. 3376 Polish, at 11d. Harvey and Freeman advise that the Peggy is arrived, and they have sold the cargo deliverable on board, payable in 2 months; the brandy at L.8:5s. per cask, and the silk for L.528; commission 2 $\frac{1}{2}$; insurance of debts 1 $\frac{1}{2}$; ex. $\frac{1}{2}$.—22d, William Blinthal has received, for goods taken in freight from Marseilles, L.75:6s. and has paid W. Parkins and Co. L.64.—24th, Drawn on Harvey and Freeman, 45 ddt. to W. Frazer, L.70; to W. Steel, for ready money, L.350; and to W. Parkins and Co. for the balance, at $\frac{1}{2}$ per cent. Paid the Thistle Bank L.200.—28th, James Bruce and I have engaged the Active, William Pillans master, for the herring fishery, to rendezvous at Campbellton; ditto Bruce $\frac{1}{2}$ concerned, and I have delivered 350 bushels falt, at 1s. 5 $\frac{1}{2}$ d.; and bought from J. Seton 300 casks, at L.20 Scots per last, per bill 2 mdt.; and paid for netts L.23:6:8, and other expences fitting out the vessel, L.12:3:4.—30th, Received from J. Dewar, Philadelphia, 200 barrels tar, to sell on his accompt; paid freight at 5s.; charges, L.1:7s.—31st, Sold J. Richards, per bill 3 mdt. 20 barrels tar, at 15s. J. Walmoden advises that he has received payment of the tobacco per the Gustavus, having been obliged to compound a debt of f.200, on accompt of the bankruptcy of the purchaser, at 50 per cent. and he has remitted P. De Hondt his bill on A. Hopp for the value, 20th July, 2 mdt. ex. 360, agio 3 per cent. at 21 $\frac{1}{2}$ d. per f. of Holland. P. De Hondt has remitted W. Parkins and Co. his bill on J. Boldero, 16 Aug. 2 ufance, being value of the remittance from Gottenburgh; agio 3 per cent.; ex. 36s. and with London par.

September 1st, The sloop Peggy being arrived at Greenock, W. Blinthal has received for freight of goods from London to Greenock, L.36:7:8, and has paid expences since 3 April, viz. provisions and repairs at Liverpool, L.18:10s.; ditto at Marseilles, Lrs.624; ex. 30 $\frac{1}{2}$; ditto at London, L.36:5s.; 5 months wages to the master, at L.8 per month; to the mate, at L.4; to 4 mariners, at 35s.; to 3 boys, at 15s.; insurance on L.600 for 5 months, at 1g. p. C. per month, policy 5s. 6d. Charged freight on the corn from Liverpool to Marseilles, at 5s. 7d. p. q.; on the brandy and silk, L.36. Sold W. Blinthal $\frac{1}{2}$ share of sloop Peggy for L.100. Paid him balance.—4th, Sold W. Nimmo, per bill 4 mdt. 300 bushels falt, at 1s. 5 $\frac{1}{2}$ d. and 50 barrels J. Dewar's tar, at 14s. 9d. Discounted at the Thistle Bank bills on D. Hart, 1 August, on J. Richards, 31 August, and on W. Nimmo. Paid bill to Thomas Hunter, 1 April.—12th, W. Parkins and Co. have paid W. Frazer at

at London, in consequence of a credit from me, per receipt transmitted, L. 50; ex. 1 per cent.—24th, P. De Hondt has remitted W. Parkins and Co. on my accompt, his bill on F. Boldero, 8 current, 2 ufa. L. , being value of f.1708 current, agio 3 per cent. ex. 35s. 10d. and with London par.; and he charges commission at $\frac{1}{2}$ per cent. and postages f.5 : 10.—25th, W. Nisbet, St Christophers, advises that he has received and sold the wine per the Industry, Lion, nett proceeds, L.1342 : 10s.; ex. 62 per cent : And shipped on my accompt, per said ship, for London, consigned to Harvey and Freeman, 40 hds. sugar, 12 C. each, at 58s. 10 bags cotton, $1\frac{1}{2}$ C. each, at L.5 per C.; 1 box indigo, 70 lb. at 12s. 6d.; charges 10s. 6d.; all currency; commission 5 per cent.: And paid William Lyon, on my accompt, per receipt transmitted, L.142 currency.—26th, Made insurance at J. Malcolm's office for L.1000 value in above, at 4 gs.; policy 5s. 6d.—31st, Paid small charges for 3 months, L.4 : 10s.; my own expences L.45.

October 1st, Sold D. Smith 70 barrels J. Dewar's tar, at 14s. 9d. Received in part L.10, and 150 Spanish dollars, at 4s. 9 $\frac{1}{2}$ d. and his note on demand for the balance.—3d, Sold W. Horsley, London, the sugar per the Industry, Lion, deliverable on board at 44s. p. C. Bought from Gabriel Hill, Glasgow, a tenement called Red Acre, consisting of warehouses and a shade and yard, fitted for a rope manufactory, with fixtures; and a lease of a shop for L.420, for which granted my bond at 5 per cent. Bought also his stock of manufactured ropes for L.112 : 4 : 9, and of hemp and other materials, L.85 : 3 : 6; for which granted bills 3 mdt. and 6 mdt. L.60 each, and 9 mdt. for the balance.—14th, James Berry acquaints me that he has settled with the underwriters for the loss on ship William, and received their notes 6 mdt. for the proportion of loss due on L.1000 insured, allowance being made for the salvage; (the ship and cargo valued at prime cost, and the sum which would cover the same computed; premium 3 gs.; short recovery 2 per cent.) and discounted these notes. Received from James Berry in full. Paid the Thistle Bank L.200.—15th, Engaged D. Fergus to manage my rope-work, at L.45 per annum, and $\frac{1}{4}$ of the profits, and delivered him to answer disbursements, L.40. Taken for the use of my rope-manufactory, the remaining 60 barrels of J. Dewar's tar, at 14s. 9d.—18th, Bought from H. Miller, for the use of my ropery, 5 tons hemp, at L.22; delivered him 150 Spanish dollars, at 4s. 9 $\frac{1}{2}$ d.; assigned him the cotton expected per the Industry, Lyon, deliverable at London, for L.40; and given him my bill on W. Parkins and Co. 2 mdt. at par for the balance. Paid William Pillans's bill on me to M. Grant, 15 ult. 1 mdt. L.70.—20th, Sent James Dewar accompt sales of tar; charged him incidents and cellar-rent, 16s. 8d.; commission $2\frac{1}{2}$ per cent.; insurance on outstanding debts, $1\frac{1}{2}$ per cent.—26th, Drawn on Jasper Van Neck, for ready money to J. Black, 25 dft. f.600, at 22 $\frac{1}{2}$ d. W. Parkins and Co. have drawn on J. Van Neck, on my accompt, 18 current,

10 dft. f.937; ex. 36s. 1d. and with London par.—31st, Paid bills to J. Seton, 28th August, and, in part, bill to J. Gordon, 31 May L.100.

November 1st, James Bruce acquaints me that he has advanced W. Pillans, to accompt of expences at the fishery, L.40. 5th, The ship Industry is arrived at London, and W. Lyon has delivered the sugar and cotton, per agreement; the freight due him for 8 months, at L.42 per month, and charges paid by him, on my accompt, during the voyage, L.7:10:6; from which deduct freight received by him on 70 hds. sugar, at 24s. and on sundry other goods, L.10:10s. W. Parkins and Co. have paid W. Lyon, on my accompt, L.100; ex. 1 per cent.—8th, Harvey and Freeman have sold the box indigo, qt. 70 lb. at 15s. 4d. per lb. commission $2\frac{1}{2}$ per cent. charges 10s. 4d.—19th, Sold for ready money, 6 puncheons rum, at L.44. Paid bill to J. Cuninghame, 16 May.—20th, William Pillans being arrived from the herring-fishery with a full cargo, I have paid shore-dues and charges L.2:10:8; his accompt of debursments at the fishery comes to L.25:6:8; freight of 25 lasts, at L.100 Scots per last.—25th, Received a debenture for bounty on the Active, Pillans, employed at the herring-fishery, burthen 54 tons, at 50s. per ton, and sold the same at 12 per cent. discount.—30th, Agreed with James Bruce to take the cargo on my own accompt, being 300 barrels, at 22s. Taken for my own use 1 barrel herrings, and repacked the cargo, and shipped the same, per the Active, Pillans, for St Christophers, consigned to W. Nisbet; used, at repacking, 30 bushels salt, at 1s. $5\frac{1}{2}$ d.; charges repacking and reshipping, L.5:3s.

December 9th, Received from the Thistle Bank L.400. Paid James Bruce and W. Pillans, in full, and bill to Tannery Co. 6 March.—10th, Received advice from D. Berry, dated 31 Oct. The amount of sales at my store is L.1254 currency, ex. 58; whereof debts to the amount of L.520 are outstanding, besides L.104 reckoned desperate. The amount of charges for a year is L.325, and the remaining goods are valued at L.820.—18th, Paid James Malcolm in full.—31st, David Fergus has brought into my shop manufactured ropes for sale, value L.165. The amount of sales of ropes at my shop, since opened, is, for ready money, L.24, 3s. on credit, L.52. David Fergus's accompt-charges at my rope-manufactory is L.67:10s. The value of hemp and other materials, and ropes not completely manufactured, L.205. Paid the Thistle Bank interest. Stated a half year's interest due A. Lindsay. Paid small charges on my business for 3 months, L.2:6:8. My own expences L.56. Charged W. Fraser's interest on his accompt. Settled accounts with him, and transferred the balance due me to new accompt. Received accompt-current from W. Parkins and Co.; they charge me interest; commission at $\frac{1}{4}$ per cent.; and postages 9s. 9d.; balanced their accompt in conformity, and transferred the balance due them to new accompt; ex. $\frac{1}{2}$. The profits

profits on Glenholm bleachfield this year amount to L.200; of which the partners agree to divide one half, and apply the other half for improving the field and extending the business. Received my share of the dividend.

CASES IN PARTNERSHIP.

I. Three merchants, Traffic, Trusty, and Trader, agree to trade in company to Italy, each one-third concerned. Traffic furnishes 300 barrels herrings, at 18s.; Trader delivers an assortment woollen goods, value L.260; which they ship, together with 200 barrels of the herrings, per the Diligence, consigned to J. Rufini, Venice. Trusty purchases, on his own credit, 30 tons logwood, at L.7:10s. and, on the credit of the company, from John Skinner, 3000 lb. tanned leather, at 7½d.; which, together with the remainder of the herrings, are shipped per the Sea Horse, consigned to P. Doria, Genoa. Trusty pays charges and insurance on the cargo to Venice, L.24:10s. and on the cargo to Genoa, L.18:6s. Trader receives bounty on the herrings at 2s. 8d. per barrel, and drawback of excise on the leather, at 1d. per lb. Rufini sells the cargo, nett proceeds 1812 ducats, which he remits to Traffic, ex. 50d.; and Traffic pays Skinner for the leather. Doria sells the cargo for 10324 liras, and ships in return silk, value 3518 liras; wine, value 5212 liras; and oil, 1594 liras; ex. 54d. per pezzo. The cargo arrives, and Trusty pays duty and charges on the silk, L.26:13:4. Traffic takes the wine on his own account, and Trader the oil, valued, by agreement, at 56d. per pezzo, deliverable on board. Trusty sells the silk for L.170 to James Hill, and, 2 months after, receives payment, but allows a deduction of L.5 in consequence of some damage sustained. Required a state of accounts between the partners, and the success of the adventures?

II. Four Merchants, J. Active, N. Tempest, W. Heartfree, and Ja. Young, agree to trade in company, each one-fourth concerned, and for that purpose they purchase, 1st May, a ship, for which each pays down L.100. Active furnishes woollen stuffs, value L.400. Heartfree purchases, on his own credit, an assortment of hardware, value L.360. Young delivers 250 pieces linen, at 30s. and they purchase, on their joint credit, 500 qrs. wheat, at 42s. from Henry Fairfield. Tempest pays charges of lading L.16:10s. and goes himself, as master and supercargo, to Lisbon, where he arrives after a hard gale, but the wheat sustains some damage. He sells the cargo, and brings home in return 50 pipes wine, at 64 milrees, and 3000 bushels salt, cost 648 milrees, ex. 5s. 6d.; and the remainder in gold, being 600 moidores. On his arrival, 12th July, the salt is sold to D. Bell, deliverable on board, at 1s. 4d. per bushel. Active pays duty and charges on the wine L.725. Tempest deli-
vers

vers Fairfield the moidores, and pays him one-half of the balance of the wheat, and Heartfree and Young pay the other half, in equal shares. Tempest's accompt of victualling, wages, and other charges, amounts to L.125, and he is allowed L.50 for his own service, by agreement.—20th July, they sell 20 pipes wine to J. Vintner, at L.32, and Active, Tempest, and Heartfree, take each 10 pipes at the same rate.—1st August, Young being discouraged at the ill success of this voyage, desires to withdraw from the copartnery, and they agree to allow him L.90 for his share of the ship, and to take the risk of recovering the outstanding debts, and advance his share on his allowing a discount of five per cent. They make allowance for the inequalities of their advance, by charging legal interest. Heartfree pays Young L.150, and Tempest pays him the balance.—10th August, Vintner pays L.500 in part of the wine, with which, and L.200 advanced by each partner, they purchase a second cargo, and Tempest proceeds with the same to Marseilles, where meeting with an advantageous offer of a freight home, he leaves the cargo in the hands of J. Conyers, who soon after returns accompt sales, nett proceeds Lrs.32643, ex. 30d. Tempest dies during the voyage home.—15th October, the ship arrives. Active receives L.216 for freight home, and draws on Conyers for the value of the cargo.—25th, He receives payment of the balance from Vintner, and Heartfree receives payment of the salt from Bell. Then the surviving partners settle with Tempest's executors, and, after allowing L.180 for charges during the voyage, and his own service, and L.80 for his share of the ship, and computing interest, as before, Active pays them the balance.—1st November, They purchase a third cargo for L.1000, of which Active advances L.600, Heartfree L.200, and the remaining L.200 is taken on credit from Bell. Active pays L.50 for repairs, and insures L.1400 on the ship and cargo, at 3 per cent. to recover 98 per cent. in case of loss; and having engaged Ben. Boatwain for master, dispatches the ship for Malaga, but it is stranded on the coast of Portugal 31st December, and the underwriters pay Active a total loss on an abandon. Active pays Bell, who allows a discount of L.5, because the credit agreed on is not expired. Required the accompts of the different partnerships, in a regular form, allowing interest for the unequal advance in each?

C H A P. III.

SUBSIDIARY BOOKS.

§ 108. **T**HE books described in the foregoing chapter are always the principal ones, and, in some cases, may be sufficient. But merchants, for the most part, find it convenient to use several lesser or *subsidiary* books, for the purpose of abridging the principal ones, or supplying their deficiencies, or exhibiting the same articles in a different point of view, or preserving an exact copy of their correspondence and engagements. The most common of these books are the following :

§ 109. I. The CASH-BOOK. This book is kept in a folio form, like the ledger, and contains the sums of money received on the Dr. and the sums paid on the Cr. The articles are entered nearly in the same manner as in the ledger, only, the particulars of each entry are commonly inserted, instead of referring to the journal; and the amount of the money received or paid each month is entered in the ledger, referring to the cash-book for particulars. By this means, the cash-account in the ledger is contracted to 12 lines, and exhibits, on inspection, a comparison of the sums that pass through the owners hands at different seasons of the year. Another use of this book is to enable the cash-keeper to check the money on hand as often as he finds necessary.

The cash-book is generally kept in the manner above described; but there are several other forms intended for different purposes. Sometimes separate books are kept for money received and disbursed, and a number of columns prepared in each for distributing the articles under different heads, as explained PART III. § 67. Sometimes the purpose of a cash-book is supplied by additional columns in the waste-book or journal, in which the cash-articles are extended. Sometimes the whole occurrences in the business are entered in the cash-book, of which we shall say more in PART V. Chap. II.

§ 110. II. BOOKS of CHARGES MERCHANTIZE, &c. The book of charges merchantize is only paged, and serves to abridge the cash-book. Sometimes it contains every article of charge, whether on particular goods and voyages, or on the business in general. But as it is intended to save the trouble of entering trifling sums in the principal books, such as postages and the like, it may be used for such articles only; and freights, duties, shop-rent, clerks wages, and other large articles, entered in the cash-book at once. The sums of this book are transferred once a month to the Cr. of the cash-

cash-book; or, if a certain sum, suppose a pound, at a time, be delivered to a clerk or shop-keeper, for petty disbursements, it may be entered in the cash-book as often as that sum is delivered.

Books of personal or family expences are also intended to abridge the cash-book, and to save the inconvenience of inserting articles not immediately relating to business. These books contain the articles of expence in a simple form, and the sums are transferred, at convenient times, to the cash-book.

A merchant should be careful that his stock, as exhibited in his books, do not exceed the real value. And therefore, if he owes any debts at the end of the year for personal expences, he should enter them in the book of personal expences, and transfer them to the principal books, by charging *Proper expences Dr. to the creditors*, for the sums due them.

§ 111. III. PETTY OR POSTAGE-LEDGER. Factors have occasion to charge their employers with the postages of letters received from them, or from others, relating to their business, and other small charges that occur in conducting their affairs. The particulars are entered in the book of Charges Merchandize, and the amount chargeable to each employer is collected in the postage ledger. This ledger only requires to be paged; the articles are posted from the book of Charges Merchandize as from a journal; the titles and index are written in the common manner, and the sum is transferred to the principal books when the accompt is settled. Thus, in set B. the amount of postages and other small charges due by James Ritchie is supposed 13s. 4d. the particulars of which will be entered in the postage-ledger. When the accompt-current is drawn out, we add the postage-accompt, and write against the sum, *Stated to his Dr. 31. December*, and transmit a note of the particulars along with the accompt-current, to our employer, if required.

§ 112. IV. BILL-BOOKS. There are several kinds of bill-books adapted for different purposes.

First, When accompts of bills receivable and bills payable are kept in the manner explained § 56—58, it is convenient to keep a register of the bills, for explaining and supplying the deficiencies of the ledger. The books used for this purpose are ruled with a variety of columns, for entering the different clauses of the bill, the time of its falling due, and the event. The following is a specimen of the book of Bills receivable for the three first months of Set B.

REGISTER OF BILLS RECEIVABLE.

No.	Sum.	Drawer.	Drawee.	Date.	Payable.	When due	Event.
1	160	J. Roffiter.	W. Penble.	1771 Nov. 15	6 mdt.	1772 May 18	Mar. 18 Pd.
2	385	G. Byron.	J. Hill.	Dec. 15	3 mdt.	Mar. 18	
3	300	Myself.	Evans & Fenton	Oct. 12	1 ddt.	Oct. 12	Jan. 28 Pd. with int.
4	89	Myself.	H. Wren.	1772 Jan. 23	8 mdt.	1772 Sept. 26	
5	232	Myself.	H. Adithie.	Feb. 1	3 mdt.	May 4	Feb. 23 Discounted.
6	583	Myself.	J. Drepier.	Ditto 20	4 mdt.	June 23	Ditto 23 Discounted.
7	136	Myself.	J. Garner.	Ditto 22	6 mdt.	Aug. 25	Ditto 23 Discounted.
8	100	Myself.	W. Blackney.	Mar. 21	3 mdt.	June 24	
9	20	J. Penble.	W. Crobie.	Ditto 29	2 mdt.	June 24	

We have only marked the payments of such bills as were paid during these three months. When the books are balanced, a list of bills on hand is made out, by selecting such as are not marked paid, or otherwise disposed of; and the sum of this list will correspond to the balance of the accompts of bills receivable. With regard to the bills discounted, the accomptant must observe whether the time of payment be elapsed, and those which are due may be presumed to be paid: But those which are still running may be returned when due, if the acceptor fails to discharge them: And as a merchant ought to have under his view a state of all the risks he is exposed to, the discounted bills still depending should be entered in a separate part of the bill-book.

A register of bills payable subsidiary to the ledger-account of that title, is kept exactly in the same manner.

§ 113. Secondly, If, in conformity to the method explained § 59, we do not enter the bills drawn on us in our principal books till paid, it is necessary to enter them in a bill-book when accepted. The form is nearly the same as the former one, though the purpose be different. The first three months of Set B. would stand thus:

REGISTER OF BILLS ACCEPTED.

No.	When accepted.	Sum	Drawer.	Payable to	Place.	Date.	Payable.	When due.	When pd.
1	1771. Dec.	10	J. Gordoqui.	P. Valconcello.	Bilboa.	1771 Nov.	6 Ufa.	1779. Jan.	1772. Jan.
2	1772. Jan.	284 7 2	A. & T. Hopp.	L. Clare.	Amster.	Jan.	1 Ufa.	Feb.	4 Feb.
3	Ditto	200	J. Hartley.	J. Hill.	London.	Ditto	25 r mdt.	Ditto	28 Ditto
4	Ditto	150	J. Vernon.	E. Bruce.	Brifol.	Ditto	25 r mdt.	Ditto	28 Ditto
5	Feb.	175	J. Ritchie.	J. Winter.	Glasgow.	Ditto	26 30 dl.	Ditto	28 Ditto
6	Ditto	76 2	J. Steinhoff for J. Ritchie }	W. Bell.	Gotten.	Ditto	25 2 Ufa.	Mar.	28 Mar.
7	Ditto	15	B. Lincoln.	J. Stone.	Virginia.	1771 Dec.	15 30 dl.	Mar.	20 Mar.
8	Ditto	150	J. Hartley.	J. Turner.	London.	1772 Feb.	22 3 dl.	Feb.	28 Feb.
9	Ditto	85	J. Ritchie.	J. Darling.	Glasgow.	Ditto	17 1 md.	Mar.	20 Mar.
10	Mar.	863 18 3	A. & T. Hopp.	J. Vervins.	Amster.	Ditto	12 4 St.	Mar.	1 Mar.

The

The bills may be entered in this book when accepted, or they may be entered from the letters of advice, and compared with the entry when accepted. A register of bills indorsed to us, and not entered in our principal books, may be kept in the same manner.

Bills of exchange, drawn by ourselves, or bought and sold, may be entered in a register after the same form.

§ 114. Thirdly, Another kind of bill-book is intended to show the sums of money which we expect to receive, or have to pay, in the order of time, that we may be in readiness to answer the demands on us. A folio may be allotted for a week, and divided into 6 parts, one for each day; and the articles payable or receivable, whether bills, or of any other kind, entered on opposite pages, so soon as they are known, on the part reserved for the day they fall due. If the articles be less frequent, those which fall due on the same week or month may be entered promiscuously, and the particular day that they fall due on, marked in a column prepared for that purpose.

§ 115. V. SUBSIDIARY LEDGER. The purpose of this ledger was hinted at § 60. If we do not enter the bills accepted by us, or indorsed to us in our principal books till payment, it is necessary to keep a separate ledger, where these bills are entered when accepted or received, in order to exhibit our engagements and securities; and this ledger is posted from a bill-book, of the second kind, above described. If we enter these bills at first in our principal books, it is still necessary to keep another ledger, for exhibiting the extent of money we advance, or are indebted; and, in that case, the subsidiary ledger is posted from the cash-book.

§ 116. VI. PROGRESSIVE LEDGER. When the articles in personal accompts are frequent and extensive, it is convenient to know how much is owing at present, by inspection, without the trouble of adding the articles in the ledger, and comparing the opposite sums. For this purpose, a separate ledger is used, where one page only is allotted for each accomp't, and the articles are entered as they occur, and added to, or subtracted from the former balance, as in computations of interest. The subsidiary ledger may be kept in this form, and columns prepared for computing the interest, as directed Part I. § 118, 119.

§ 117. VII. BOOKS OF ACCOMPTS-CURRENT, INVOICES, AND ACCOMPTS SALES. These books contain exact copies of the accompts and invoices sent off. The form of these papers was fully explained Part III. Chap. III. Some merchants also keep books for copying the invoices and accompts received; but, if the accompts themselves be carefully preserved, it answers the same purpose.

§ 118. VIII. MEMORANDUM BOOKS. These books are of different kinds, as the nature of the business requires.

A book of commissions may be extracted from the letters of our correspondents, or marked down, upon receiving verbal orders. It contains a distinct note of every affair in which we are employed, whether goods to be bought, or other business to be transacted. The opposite page, or a marginal column, may be reserved for marking the execution or impracticability of executing these orders. The following is a specimen :

Aug. 15. From J. Thornton's letter 28 July,
To ship per first vessel, for Hamburgh,

500 quarters barley, if under 26s.	{ Shipped per the Fair Trader.
500 quarters wheat, if under 40s.	
	{ Not to be got at the price limited.

A warehouse book is to be kept by factors intrusted with the custody or sale of goods. It contains the different articles received into the warehouse, the marks, packages, owners names, &c. on one side, and the delivery of the same on the other.

Other memorandum books may be necessary, for entering business transacted at fairs, taverns, and the like, and for various purposes, which it is needless to enlarge on, as the exigencies of the business will suggest them.

§ 119. IX. RECEIPT-BOOK. This book contains the receipts granted to a merchant for the payments he makes, which are signed by the receivers. It is intended to save the risk of losing detached papers.

§ 120. X. LETTER-BOOK. Merchants ought to keep an exact copy of all the letters on business they dispatch. A folio book is prepared for this purpose; the names of his correspondents are written in text on the margin, and entered in an index. The letters are usually copied in the order they are written. Sometimes a portion of the letter-book is allotted for each correspondent, that the state of our transactions, as narrated in the letters, may be conveniently inspected.

The style of a merchant's letter should be clear, nervous, and concise. There should be nothing defective, nothing superfluous, and nothing ambiguous. It should give full information of every business transacted or required, and of every fact inquired into, without digression, or unnecessary form. More particularly,

We should begin with referring to any former letters of ours to which we have not yet received an answer; then we should mention the letter or letters we have received, and give a full reply to every particular they contain, in their order, before we enter upon any new matter.

When bills are drawn or remitted, they should be fully narrated, with the circumstances of date, time of payment, and names of the parties

parties concerned. When we receive bills from our correspondents, or receive advice of his draughts on us, it is not sufficient to notice it in a general manner in our answer: The particulars should be distinctly specified.

When we commission goods from a person whom we have not been accustomed to deal with, we should describe the qualities, the limits at which we are willing to take them, and the manner of conveyance, very minutely. When we consign goods, we must instruct our factor at what price, and at what credit, we are willing to sell, and in what manner he is to dispose of the money when he receives it. If any thing be reserved to his discretion, it should be expressed in such plain terms, that there may be no room to doubt where he is restricted, and where his power is discretionary. But it is not necessary when we are in the course of dealing, whether in purchases or consignment, to repeat every particular in every letter. The usual orders, if not countermanded, are understood to be continued; and some things may be determined by the customs of the place, which the employer is understood to comply with.

In giving orders for insurances, we must be exceedingly pointed, as immediate dispatch is necessary. We must mention the ship, master, and voyage, the sums to be insured on ship, cargo, and freight, the time at which it is warranted safe, and the premium we are willing to give.

Factors not only write their correspondents of the execution of their orders, but generally acquaint them of the state of trade at their place of residence, the courses of exchange, the prices of exports and imports, the quantities and qualities at market, and any probable conjectures of their rising and falling.

Letters of credit contain the extent of money to be advanced, the person in whose favour they are granted, the voucher to be taken for it, and the manner of reimbursement. They generally contain an alternative with respect to the sum, but are seldom unlimited.

If we grant a letter of recommendation for which we do not mean to bind ourselves, we must express our meaning so carefully, that it cannot possibly be mistaken for a letter of credit.

Advice respecting the circumstances of other merchants, and their suspected deficiencies, are necessary in confidential correspondence, but require the utmost prudence and caution.

In cases of dispute, the reasons upon which we found the justice of our claims, should be clearly stated, without any expressions of acrimony or resentment.

Every article for which our correspondent is indebted to us should be distinctly noted in our letter. If several articles occur to be mentioned in the same letter, we add them, and write against the sum, *Placed to your Dr.* We specify the articles for which we are indebted to him in the same manner, and write against them, *Placed to your Cr.* Thus, our letters contain a full state of our deal-

ings; they might afford materials to draw out our accompts, and may be used to check them when drawn out from other books in the common manner.

The letters we receive from our correspondent should be marked with the writers names and dates, and carefully filed in regular order, and preserved. We may have recourse to them occasionally, for explaining a transaction; but it is better if our own letters be complete in themselves, so as to require nothing extraneous to explain them.

Articles of public intelligence may be mentioned by a foreign merchant in his letters of business, without impropriety. But matters of friendship, and private confidence, never should be mentioned along with matters of business, as the latter may require to be exposed or communicated to neutral persons.

§ 121. *Specimen of the Letter-Book.*

J. Velasquez, Madeira,

London, 16 Jan. 1772.

I duly received your favour of 28 November last, and thank you for the advices concerning the state of trade it contains: In consequence of which I have shipped an assortment goods per the Mercury, William Hanway master, now ready to sail for Madeira, consigned to your address. The cost, per annexed invoice, is L. 395 : 4 : 6, including insurance. You will pay the freight, which we have agreed at 5 per cent. on the amount of the invoice, exclusive of insurance. I am confident you will do all in your power to dispose on them to the best advantage; but desire that, if you cannot procure at least 25 per cent. advance on the invoice, you may keep them till further orders.

Captain Hanway is to take in goods in freight for the West Indies as soon as his cargo is delivered. I desire you may ship 20 pipes best wine, vintage 1770, on my accmpt, consigned to D. Mason, Barbadoes, if it can be done under 85 milrees per pipe. I hope you will assist Captain Hanway to complete his freight; and, if he has occasion for credit to the extent of 4 or 500 milrees, you will please supply him on my accmpt, and transmit me his receipt.

As the wine will probably come higher than the nett proceeds of the goods, you may draw for the balance on Mr F. Brago of Lisbon, on my accmpt: And, if the goods do not sell readily, and you cannot conveniently advance the value of the wine, you may draw on him for the whole amount: And you are to remit him the nett proceeds of the goods, in case the wine cannot be shipped within the limits above mentioned.

Frederic Brago, Lisbon,

London, 16 Jan. 1772.

I refer you to mine of 18 ult.; and not being favoured since with any from you, have only at present to desire, that, if Mr J. Velasquez of Madeira should draw on you, on my accmpt, to the extent

tent of 2000 milrees, or thereby, you may duly honour the same; and, if you have not effects of mine in your hands, you may draw on me for your reimbursement. If Velasquez remit you any money on my accompt, you may advise me per first, and retain it till further orders.

James Ritchie, Glasgow,

London, 7 March 1772.

I received, in course, your favours of 17 ult. and 1st current. By the former, you advise your draught on me to J. Darling, 1 mdt. L. 85, which is duly honoured, and placed to your Dr.; and, by the latter, you remit me J. Hogg on Penant and Johnson, 30 ddt. L. 268 : 12s, which will be placed to your Cr. when in Cash.

Henry Valville, Bourdeaux,

London, 29 June 1772.

I refer you to mine of 25th ult.; and having now disposed on the remainder of your wine, I send you, annexed, accompt sales, nett proceeds, L. 651 : 15 : 11, placed to your Cr. which I hope will give satisfaction.

I remit you, inclosed, H. Johnson on W. Le Maitre, 5 current, 60 ddt. Lrs. 2000, Ex. 29 $\frac{1}{2}$, L. 82 : 12 : 9, placed to your Dr.; and your bills on me for the balance shall be duly honoured.

Adrian and Thomas Hopp, Amsterdam,

London, 20 June 1772.

I refer you to mine of 8 current : Since have your favour of 12th ditto; by which you advise that you had received on my accompt,

from J. Barneveldt	-	-	-	f 4433 : 6
a remittance from C. Meldrup, Copenhagen				777 : 15

Placed to your Dr. f 5211 : 1

And you remit us your bill on E. Wilmot, 14 current, 2 ufa.

L. 288 : 12 : 2.	Ex. : 35 : 5	-	-	f 3066 : 10
	Agio 3 $\frac{1}{4}$	-	-	99 : 14

Placed to your Cr. f 3166 : 4

Frederic Brago, Lisbon,

London, 15 May 1772.

This will be delivered you by Mr John Beaumont of Hartfield, who goes to your place for the recovery of his health. I recommend him to your favour and good offices, and desire you may furnish him with what money he has occasion for, on my accompt, to the extent of two thousand milrees, and transmit us his receipt for the same; and, if you have not effects of mine in your hands, you may draw on me, at usance, for the value.

James Ritchie, Glasgow,

London, 31 Dec. 1772.

I refer you to mine 7 current, since which have none of your favours. I transmit you, as usual, a copy of your accompt-current for this year, balanced by L. 1107 : 7 : 9, due me to your Dr. new accompt. You will please examine it; and, if you find it right, state the balance in conformity, and advise. You have the computation of interest, and note of postages inclosed.

AN

AN
INTRODUCTION

TO
M E R C H A N D I Z E.

PART V. PRACTICAL BOOK-KEEPING.

C H A P. I.

VARIETIES IN ITALIAN METHOD.

§ 1. **I**N the former Part, we have explained that form of book-keeping which is most agreeable to strict method, or general practice. However, as some of the rules we have laid down are arbitrary, and may be varied without inconvenience, so it must happen, that different accountants will not adhere precisely to the same plan; and the nature of the business may render such variations proper. The form of the principal books may sometimes be rendered simpler and shorter; sometimes fewer may be necessary, or others substituted in their place; sometimes they may be thrown into a different order, better suited to the matter they contain. It is obvious that no treatise can comprehend all the variety of methods which different kinds of business may require, or which different merchants or others may chuse to follow. It will be useful, however, to explain a few, for the learner's instruction; and, if these be understood, he will acquire a readiness in selecting or inventing proper ones, suited to every circumstance. A full knowledge of the regular method is absolutely necessary for understanding some of the following ones, and highly useful for them all.

§ 2. Instead of a journal kept in the form already explained, sometimes a fair copy of the waste-book is taken, and the Drs. and Crs. marked at the foot of each article, or in a column reserved for that purpose in the margin. The following example from Set A. will explain this method sufficiently.

§ 5. In writing the Cash-Book observe the following directions :

1st, Besides the usual columns for dates and sums, it is ruled with an additional column, where the references to the folio of the ledger are inserted.

2d, Every article of money received is entered on the Dr. only, and money paid on the Cr. only. Other articles are entered on both sides, and so do not alter the balance, which always exhibits the money on hand.

3d, The names of the Dr. and Cr. are written in half-text, and a full narration annexed, as there is no other book to refer to. But, when an article is entered on both sides, it is sufficient to narrate it on the side to which it more naturally belongs, and to refer thereto on the other side, by writing *per contra*.

4th, In order to enter articles when no money is paid or received, you must conceive them resolved into two or more cash-articles, that would have the same effect, and enter these accordingly. The accountant who understands the Italian method may be directed by the following rule: *Suppose the article journalized; enter the Drs. of the journal-post on the Cr. of the Cash-book, and the Crs. of the journal-post on the Dr. of the Cash-book.*

§ 6. The LEDGER is posted from the Cash-book, as already mentioned. The form of the entries, however, will be a little different, and more simple than those of the Italian method. To explain this, we may conceive all the ledger-entries derived from a journal, which is not kept, but understood. Every simple post in such a journal would either be, *Cash Dr. to some Account*, or *some Account Dr. to Cash*, and accordingly would be posted either to the Dr. or the Cr. of the Cash-account. Thus, all the corresponding entries to the articles in the other accounts are contained in the Cash-book, (which must be considered as part of the ledger) instead of being interspersed through the ledger, as they are by the Italian method. It follows that every line on the Dr. of the ledger should begin, *To Cash*, and on the Cr. *By Cash*; but, as Cash is universally the corresponding account, it may be always understood and omitted; and the words *To* or *By* may be followed by a simple narration. References, when necessary, are made from the ledger to the Cash-book.

The inventory may either be prefixed to the Cash-book, or the substance of it may be inserted by fiction in the Cash-book, as the accountant chuses. The books are balanced by transcribing the closing articles from the profit and loss and balance sheets, as in Set B.

§ 7. This method is a very good one where the greater part of the occurrences are in reality cash-articles. As a specimen, we shall annex the Cash-book of the first month of Set A.

PRACTICAL BOOK-KEEPING. PART V. CASH-BOOK.

Dr.

1774.			fo.			
Jan. 1	To balance on hand	-	-	75	10	—
3	To Meal, for 50 bolls, to J. Cuthbert, at 13s 3d	-	2	33	2	6
5	To Yarn, for 60 spindles five hank, at 2s 4d in barter	-	2	7	—	—
13	To William Bruce, for salt and iron per contra	-	5	70	—	—
15	To paper, for 30 to J. Boswell, at 12s	L 18	—	—	—	—
	12 to J. Henderson	12	7	4	—	—
	5 for ready money	11	2	15	—	—
	47		2	27	19	—
18	To Salt, for 150 bushels, at 1s 9d, to W. Hunter	-	4	13	2	6
22	To Henry Hardie, in full of his bill	-	3	75	—	—
—	To Profit and Loss, for interest on ditto	-	1	2	10	—
26	To A. Sharp, for balance of yarn p. contra	-	5	32	18	4
30	To Port-wine, for 6 hds. at L. 16, in barter for meal	-	2	96	—	—
				433	2	4
				430	2	1
	To balance on hand	-	-	3	—	3

Contra

Cr.

1774.			fo.			
Jan. 3	By Calicoes, for 105 yds. at 3s 2d	-	4	16	12	6
—	By J. Cuthbert, for meal per contra	-	4	33	2	6
5	By Diaper, for 80 yds. at 1s 9d, in barter	-	4	7	—	—
10	By William Nisbet in full	-	4	28	7	3
13	By Salt, for 200 bushels, at 1s 8d, from W. Bruce	-	4	16	13	4
—	By Iron, for 320 stones, at 3s 4d, from ditto	-	5	53	6	8
15	By J. Boswell, for paper per contra	-	3	18	—	—
—	By J. Henderson, for ditto	-	5	7	4	—
18	By W. Hunter, for balance of salt	-	5	3	2	6
22	By Royal Bank, paid them	-	3	100	—	—
26	By Yarn, for 500 spindles four hank, from A. Sharp, at 1s 11d	-	2	47	18	4
30	By Meal, for 150 bolls, at 13s 2d	-	2	98	15	—
				430	2	1

The Cr. is placed under the Dr. for the conveniency of printing.

If the accomptant dislike the fictions adopted in this method, he may enter nothing in the cash-book but real Cash articles, and keep a journal for other occurrences. In this case, the ledger is posted partly from the Cash-book, according to the method here explained, and partly from the journal, according to the Italian method.

C H A P. III.

METHOD WITH ALLOWANCE OF INTEREST.

§ 8. **I**N all commercial countries there is a fixed rate of interest, and the merchant's gain should only be estimated by the excess of his gross profits above the interest of his stock. The latter may be obtained with little risk or trouble; the former alone is the reward of his industry, and the compensation for his hazard. And, if the profit of his trade be less than his stock would have yielded at common interest, he may properly account it a losing one.

It is easy to form a general estimation of his profits in this sense, by deducting the interest of his nett stock from the gain which the balance of his books exhibits: But it is a matter of some difficulty to determine the gain or loss on each branch of his business, with allowance of interest for the money employed in it.

The accomptant will readily perceive, that, for this purpose, interest must be computed in the several accompts of goods and voyages on which money has been advanced; and, if this interest be deducted from the gross gain, or added to the loss, the real success of each branch will be exhibited.

The common order of an accompt of goods in the ledger is by no means proper for instituting a computation of interest. The goods are entered on the Dr. when bought, and on the Cr. when sold; and, if interest were computed thereon, it would extend from the time of purchase to the time of sale; whereas it ought to extend from the time of advancing the money till the time of recovering payment. For this purpose, accompts of goods must be kept in an order that exhibits the extent and continuance of the advance; where nothing is entered on the Dr. till the money be laid out, and nothing in the Cr. till the money be recovered. Progressive computations of interest on these accompts, drawn out as directed PART I. § 118. will show what the money employed in each branch of trade would have yielded at common interest, and consequently determine the real gain or loss.

If we buy goods at long credit, and sell them for ready money, or on short credit, we may happen to have the money in our hands for some time; and, as we may lend it out at interest, or employ it in other branches of our business, during the interval, the advantage arising

arising from it, computed as above, should be added to the profits, or deducted from the loss on the account which yields it.

The accountant will understand how this may be done, if he apprehend this leading idea, that the property of goods, in some sense, is not acquired till paid for; and, in some sense, not conveyed till payment be received.

The books required are, a Waste-book, Journal, and two Ledgers.

§ 9. I. The WASTE-BOOK. In the inventory, the debts due to us are not placed after the goods in the common form, but are arranged under the title of the goods from which the debts arose. Thus, wine on hand, and debts for wine formerly sold, are arranged and extended together; and, though some kinds of goods be entirely sold, if part of the debts arising from their sale be still owing, the title must be continued in the inventory, and these debts arranged under it. Thus, the inventory will contain, first, the ready money on hand; then the goods on hand, and debts arising from each; and, lastly, the debts owing us, for money lent or otherwise, not connected with any account of goods. In like manner, the list of debts due by us is arranged under the titles of the goods purchased.

Purchases and sales are entered in the common manner: But, when payments are received or made on personal accounts, the kind or kinds of goods for which the debt was contracted, are mentioned.

§ 10. II. The JOURNAL. In order to understand the Journal, the accountant must observe that it is to prepare for the first ledger, which contains no personal accounts, except those on which interest is charged. The articles proper to be entered in the Journal are selected from the waste-book, and different marks are prefixed to the articles entered, and to those omitted.

The Journal-entries are as follows: for the Inventory, *Sundries Drs. to Stock*; *Cash*, for ready money; *Goods*, for value on hand, and outstanding debts; and *Personal Debtors*, for other debts.

When goods are bought for ready money, *Goods Dr. to Cash*; when sold for ready money, *Cash Dr. to Goods*.

When goods are bought or sold on credit, there is no Journal-entry, unless interest is to be computed from the time of sale; in which case, the entry is the same as in the common form.

When payments are received, *Cash Dr. to Goods*, for which the debt was owing. When payments are made, *Goods Dr. to Cash*.

When goods are sent abroad, *Voyage Dr. to Goods*, if formerly our own, or, *To Cash*, if bought for ready money, and for charges. But, if the goods be bought on credit, there is no journal-entry when purchased, and the entry, when paid, is *Voyage Dr. to Cash*. The journal entries, in other cases, will be obvious, if the nature and design of the ledger be understood.

§ 11. III. The FIRST LEDGER, Which contains the stock, profit and loss, and subsidiary accounts, in the common form, accounts of goods and voyages in a peculiar form, and such personal accounts only as interest is regularly charged on.

On the Dr of the accounts of goods, there is entered the sums of money paid out for purchase or charges; and, on the Cr. the sums received, for what is sold. The balance shows how much money we have employed in every article of our trade, when the Dr. is greater; or how much money we have in hand, by dealing in certain articles, if the Cr. in any accounts be greater.

This ledger is posted from the journal described above, in the common manner.

§ 12. IV. The SECOND LEDGER contains accounts of goods and voyages, in the common form, and all personal accounts, except those on which interest is computed. It may be posted immediately from the waste-book; or, if the accountant pleases, he may keep a second journal, to prepare for it.

§ 13. When the books are to be balanced, we must compute and charge the interest on every real and personal account in the first ledger; then we collect the debts which are owing to us, under the titles of the accounts from which they proceeded. As the accounts of goods in the second ledger contains the quantities bought and sold, we shall find, from the balance of their inner columns, whether the whole be disposed of, or how much is on hand: And, as the sales are entered in the Cr. in the second ledger, when they happen, but, in the former, not till payment be recovered, we shall find how much is still owing, by comparing the Cr. of the corresponding accounts in the different ledgers. We may affix a mark to such articles in the second as are also in the first; and the remaining ones must be selected and arranged under the value of the goods on hand; or, if partial payments be made, the balance must be taken.

Now, if we have paid for all the goods, the Dr. of the account in the first ledger exhibits the price for which we bought them; the charges paid out, and the allowance of interest for advance: The Cr. contains the money we have received for them; and the balance, collected as above, shows the value still on hand, together with the extent of outstanding debts. If these be added and compared with the sum of the Dr. the gain or loss will be ascertained.

But if the whole, or part of the goods, be still owing by us, we must make allowance for the same, before we can ascertain the gain or loss.

The accounts of goods, when the gain or loss is charged, will balance by the amount of the value on hand and outstanding debts, or, by the difference between that amount and the debts which we owe on these goods. The same observations and rules apply to voyages, ships, or property of any kind. When the balances of all the accounts in the first ledger are collected, the stock and balance accounts will correspond, as in the common form.

If a debt has become desperate, it should be omitted in the list, under the title of the goods; by which means, losses by bad debts will be referred to the particular accompts on which the debts were contracted; and, as some branches of trade are more exposed to this kind of hazard than others, the merchant will have the advantage of knowing the actual success of each, when every loss arising from it is included.

The balance of the interest-accompt will be nearly equal to the interest of the nett stock. It would be exactly equal, if we never kept any money on hand; and, as merchants are careful to regulate their affairs so as never to have much unemployed, the difference will not be considerable.

This form of book-keeping is the most perfect of any; but the additional trouble is considerable. It is therefore improper where the articles are small and numerous; but when the articles are generally extensive, and the credit long, it may be used to advantage. If it be thought too tedious to follow it through every branch of the business, we may confine it to accompts of greater extent and importance, and to keep the others in the common manner.

§ 14. The following are materials for a set of this kind, to which we have annexed the journal of the first month, and the accompt of Madeira wine in both ledgers:

INVENTORY. Glasgow Jan. 1. Ready money L. 55 : 10s. - 75 barrels rice, at 18s. J. Nisbet owes for 3 ditto, at 19s. - 20 pipes Madeira wine, at L. 72. W. Burnet owes 3 for ditto, at L. 75. D. Gordon, for 2 ditto, at L. 74 : 10s. Tho. Bell, for one, at L. 75 : 5s. W. Burnet owes for 30 C. tobacco, at L. 3. H. Stewart, for 20 ditto, at L. 3 : 3s. I owe the Merchant Banking Company L. 700.

JAN. 10. Sold for ready money 6 barrels rice, at 19s. - 12th, Bought from W. Brown 12 puncheons rum, at L. 42 - 15th, Sold D. Johnson 2 pipes Madeira, at L. 74 : 12s. and 2 puncheons rum, at L. 43. - 25th, Received from W. Burnet in part, for Madeira, L. 150, and from J. Nisbet, in full for rice. Paid the Merchant Banking Company L. 180. - 31st, Shipped per the Swift, Horner, for Jamaica, consigned to Tho. Smith, 12 bales linen, from W. Biggar, L. 245. 30 boxes hardware from D. Johnson, L. 180. Paid charges shipping L. 2 : 2s. and part freight, L. 8 : 8s.

FEB. 3d, Sold 3 puncheons rum for ready money, at L. 42; 2 ditto to W. Burnet, L. 43 : 10s. and 1 ditto to Tho. Hay, L. 45. - 20th, Received from W. Burnet, in full, for tobacco. Sold T. Hay, 3 pipes Madeira, at L. 74 : 15s.

MARCH 3d, Received from W. Burnet, in full, for Madeira, L. 75, in part, for rum, L. 50. Sold D. Spence 50 barrels rice, at 19s. 6d. 2 puncheons rum, at L. 43 : 5s. - 20th, Received from D. Johnson, in full, for Madeira and rum; from Thomas Hay, in full, for rum. Paid the Merchant Banking Company L. 180. - 30th,

Paid W. Brown in part, for rum, L.100; D. Johnson, in full, for hardware.

APRIL 1st, Sold H. Stewart 3 pipes Madeira, at L.73:10s.—5th, Received from D. Gordon, in part, for Madeira, L.100, and from D. Spence, in part, for rum, L.50.—6th, Sold for ready money 5 pipes Madeira, at L.73, and 1 puncheon rum, L.43.—7th, Paid W. Brown in full, for rum.—12th, Received from J. Horsley, Madeira, 6 pipes wine, amount, per invoice, 925 milrees, at 5s. 7d.—15th, Received from H. Stewart, in part, for Madeira, L.150, and in full for tobacco. Received from D. Spence, in full, for rum and rice.—18th, Sold for ready money 10 barrels rice, at 19s.—20th, Received from the Merchant Banking Company L.200. Bought for ready money 30 hds. claret, at L.27.—25th, Sold D. Gordon 9 bar. rice, at 18s 6d.—30th, Received from D. Gordon, in full, for Madeira, and from T. Hay, in part, for ditto, L.150. Paid freight, duty, and charges, on 6 pipes Madeira, L.125.

MAY 1st, Sold 1 puncheon rum. to T. Hay, at L.42:15s.—3d, Sold for ready money 2 pipes Madeira, at L.76.—8th, Received from D. Gordon, in full, for rice, L 8:6:6.—25th, Paid cellar-rent and coöperage on Madeira, L.2:10s.—28th, Sold Thomas Bell 1 pipe Madeira, L.74. Bought from D. Graham 5 pipes claret, at L.52.

JUNE 1st, Received from T. Smith accompt sales of goods per the Swift, N. P. L.780 currency, Ex. 50.—5th, Sold D. Johnson 2 hds claret, at L.28, 2 pipes Madeira, at L.74.—7th, Received from H. Stewart, in full, for Madeira.—8th, Received from Th. Smith 10 hds. fugar, amount, per invoice, L.372 currency. Paid freight, duty, and charges, on fugar, L.56.—10th, Received from T. Smith his bill on G. Harris, London, 60 dft. being value of L.408 currency.—15th, Sold Thomas Fisher 2 pipes Madeira, at L.73:5s. to bear interest from delivery. Sold for ready money T. Smith's bill on Geo. Harris, par.—18th, Paid J. Horsley's bill on me to R. Mill, 15 May, 2 mdt.—20th, Sold for ready money 10 hds. fugar, qt. 120 C. at L.2:12s per C. Paid W. Biggar, in full, for linen sent to Jamaica.—30th, Paid the Merchant Banking Company interest; charges, and expences, for 6 months, L.100.

JOURNAL.

Glasgow, 1 January 1778.

*Sundries Drs. to Stock.**Cash,* - - - - - L. 67 10 - 55 10 -*Rice,* for 75 bls. at 18s - - - L. 67 10 -
and due by J. Nisbet for 3 ditto, at
19s. - - - - - 2 17 -

70 7 -

Madeira wine,

for 20 pipes, at L. 72 - - - L. 1440 - -

and due by W. Burnet, for 3 do. at
L. 75 - - - - - 225 - -

by D. Gordon, for 2 ditto, at L. 74 : 10s. 149 - -

by T. Bell, for 1 ditto - - - 75 5 -

1889 5 -

Tobacco,

due by W. Burnet, for 30 C. at L. 3 L. 90 - -

by H. Stewart, for 20 C. at L. 3 : 3s 63 - -

153 - -

2168 2 -

Stock Dr. to Merchant Banking Co. Due them p. acc. 700 - -

10.

Cash Dr. to Rice, for 6 barrels, at 19s. - - 5 14 -

25.

*Cash Dr. to Sundries,**To Madeira Wine,* from W. Burnet in part
L. 150 - -*To Rice,* from J. Nisbet, in full - 2 17 -

152 17 -

Merchant Banking Co. Dr. to Cash. Paid them 180 - -

31.

Voyage to Jamaica, per the Swift, Horner, *Dr. to Cash.*

Paid charges at shipping a cargo consigned to Tho.

Smith - - - - - L. 2 2 -

and part freight - - - 8 8 -

10 10 -

FIRST

FIRST LEDGER.

Dr.

MADEIRA WINE,

1778.

Jan. 1.	To Stock, for quantity on hand, and debts per J.	-	-	-	L. 1889	5	—
April 30.	To Cash, paid duty and charges on 6 pipes	125	—	—			
May 25.	To Cash, paid cellar-rent and cooperage	2	10	—			
June 18.	To Cash, paid J. Horsley's bill to R. Mill,						
	15 April, 2 mdt.	-	-	-	258	4	7
30.	To interest-accompt	-	-	-	31	8	5
	To Profit and Loss	-	-	-	54	6	—
					L. 2360	14	—

Contra

Cr.

1778.

Jan.	25.	By Cash from W. Burnet in part	-	-	L. 150	—	—	
Mar.	3.	By Cash from ditto in full	-	-	75	—	—	
	20.	By Cash from D. Johnson in full	-	-	149	4	—	
April	5.	By Cash from D. Gordon in part	-	-	100	—	—	
	6.	By Cash for 5 pipes, at L. 73	-	-	365	—	—	
	15.	By Cash from H. Stewart in part	-	-	150	—	—	
	30.	By Cash from Sundries	-	-	199	—	—	
May	3.	By Cash for 2 pipes, at L. 76	-	-	152	—	—	
June	7.	By Cash from H. Stewart in full	-	-	70	10	—	
	15.	By Tho. Fisher for 2 pipes at L. 73 : 5s	-	-	146	10	—	
	30.	By Bal. acc. for quantity on hand and debts	-	-	803	10	—	
							L. 2360 14 —	

SECOND

SECOND LEDGER.

Dr.

MADEIRA WINE,

1778.		P.
Jan. 1.	To Stock on hand at L. 72 -	20 1440 — —
Apr. 12.	To J. Horsley, Madeira, per invoice	6 258 4 7
30.	To Cash, paid freight, duty and charges on 6 pipes - - -	125 — —
May 25.	To Cash, paid cellar-rent and cooper- age - - -	2 10 —
	To interest accompt - - -	31 8 5
	To Profit and Loss - - -	54 6 —
		26 1911 9 —

Contra

Cr.

1778.		P.
Jan. 15.	By D. Johnson, at L. 74 : 12s. -	2 149 4 —
Feb. 10.	By T. Hay, at L. 74 : 15s. -	3 224 5 —
Apr. 1.	By H. Stewart, at L. 73 : 10s. -	3 220 10 —
6.	By Cash, at L. 73 - - -	5 365 — —
May 3.	By Cash, at L. 76 - - -	2 152 — —
28.	By Thomas Bell - - -	1 74 — —
June 5.	By D. Johnson, at L. 74 - - -	2 148 — —
15.	By Tho. Fisher, at L. 73 : 5s. -	2 146 10 —
30.	By Balance on hand, at L. 72 -	6 432 — —
		26 1911 9 —

Accompts in First Ledger: Stock, Profit and Loss, Interest-accompt, Charges and Expences, Cash, Rice, Madeira Wine, Tobacco, Rum, Voyage to Jamaica, Claret, Merchant Banking Company, Tho. Fisher.

Accompts in Second Ledger: Rice, Madeira Wine, Rum, Voyage to Jamaica, Claret, J. Nisbet, W. Burnet, D. Gordon, Tho. Bell, H. Stewart, W. Brown, D. Johnson, W. Biggar, Th. Hay, D. Spence, J. Horsley, D. Graham, T. Smith, Bills of Exchange, Sugar.

CHAP.

C H A P. IV.

SHOP-KEEPERS ACCOMPTS.

§ 15. **S**HOP-KEEPERS, whose business consists chiefly in retail, have occasion for a more concise form of book-keeping than the regular Italian method. As the articles sold are often very numerous, and very small, they cannot bestow the labour of entering each in a variety of places, and have been led to invent other methods, more or less perfect, as their leisure or their skill admitted. Among the least perfect methods we may reckon those where none but personal accompts are kept in the ledger, and where there is no other way of computing their stock, but by collecting the articles due to them from the ledger, and adding thereto the value of goods on hand, from an inventory; and subtracting from that amount the debts they owe. Next to these, are methods where some general accompts are kept in the ledger, to exhibit the extent of the sales, and the gain upon the whole goods sold, although not on each particular kind: And it is a farther improvement, if there be a regular check on the quantity of goods, or, at least, an opportunity of checking them, as often as the owner chooses, by comparing the purchases with the sales. The most perfect methods are those which exhibit the gain or loss on each particular kind of goods.

When the value sold at a time is generally considerable, and the variety of articles not very great, a more regular method may be followed. When the sales are very small, numerous, and of great variety, a shorter one must be used. We shall explain several methods, advancing from the easier to the more complete, that the accomptant may choose that which seems best suited to the circumstances of his business.

§ 16. And, first, it is necessary to have a full record of all transactions entered in one or more books, as soon as they take place. Some keep a cash-book and day-book for this purpose, and enter the ready money received or paid in the one, and all other occurrences in the other. We would recommend it as a far preferable way to have one book only before us in the hours of business, and to enter all transactions there, in the order they take place. If we have to turn to different books, or different places of the same book, there is a risk that we may make the entry in a wrong place, or in more places than one, or omit it altogether: not to mention the inconvenience of recurring to the different books when business is throng.

§ 17.

§ 17. Next, it will facilitate the business, that this original book or day-book be ruled with several columns, for the purpose of selecting and extending separately such articles as we have occasion to inquire the amount of.

And here we may have two additional columns, one for cash received, another for cash paid. By this means, the day-book will also supply the place of a cash-book, and the cash-columns may be balanced every day, or as often as necessary. If it be intended to have none but personal accounts in the ledger, there is not a simpler or better method than this. It only requires a day-book and ledger. The former also supplies the place of a cash-book; the form of both is simple, and the latter is posted from the former.

§ 18. If it be intended to close the ledger by a regular balance, we would recommend a different form for the day-book.

Almost all the transactions in retail-business may be arranged under the following heads: Ready money sales, Sales on credit, Payments received, Payments made, and Goods bought. Of these, the two former are by far the most numerous.

We may therefore reserve two columns in the day-book for extending the values of articles sold, one intitled Cash, the other, Credit. The sums of these columns exhibit the extent of the weekly or monthly sales.

It will be sufficient to enter the amount of the invoices of goods received in the day-book. The invoices should be copied in a book kept for that purpose; and the inventories of the goods on hand, taken once a year, or oftener, may be inserted in the same book.

Purchases, payments, bill-transactions, and all miscellaneous occurrences, may either be expressed in common language, or in the style of Dr. and Cr. as the accountant chooses; and their sums are not extended to either of the columns reserved for the sales.

§ 19. The ledger contains the following accounts: The Stock Account, and Profit and Loss Account, together with the subsidiary accounts of Charges Merchandize, Proper Expenses, Abatements, and any others the business requires;

The Cash account: Or it may be better to keep a separate Cash-book, as it will be frequently necessary to try the balance. In either case, the Dr. contains the sums received in payment of goods formerly bought; but the sum drawn for ready-money sales is entered weekly, or monthly, from the cash-column of the day-book; and, when the balance of the cash is tried at intermediate times, the amount of the ready-money drawn since the last entry must be comprehended. All the articles paid out are entered separately on the Cr.

An account, intitled, *Goods, or Merchandize*, which contains on the Dr. the value of the goods on hand, when the books were opened; or purchased, while they are carried on; and, in the Cr. the amount of the sales, taken weekly or monthly from the day-book.

The

The Cr. may be ruled with three columns, one for the ready-money sales, one for the sales on credit, and one for the total. This accompt will exhibit the course of the sales at different times, and the proportion of the ready-money to the credit, in a very satisfactory point of view; and, when the value of the goods on hand is included, the balance will show the gain or loss.

Personal accompts in the common form: Only, as there is often a variety of articles furnished at different times, and paid for at once, and therefore the entries on the Dr. are much more frequent than those on the Cr. it answers very well to enter both on the same page, and extend the sums in different columns. In conformity to the Italian method, the style of the articles on the Dr. would be, *To Goods for*, &c. but the words of style may be omitted without inconvenience. When a single article is sold it is mentioned; when several things are sold together, we may refer to the day-book for particulars.

The ledger is balanced according to the Italian method, and the balance-accompt inserted in the same manner.

§ 20. We would therefore recommend the use of four books. I. A Day-book. II. An Invoice-book. III. A Cash-book. IV. A Ledger. The first and last alone are necessary; the other two are added for convenience: And, in order to keep a check on the quantity of goods, there will be occasion for

V. A book of wares. In this, the quantities of goods on hand, or purchased, are entered, on the top of a page, from the invoice-book; under which, the quantities sold are entered from the day-book, the date being prefixed to each article. It is easy, by comparing the sums, to discover whether we have a just accompt of the goods, when the parcel is sold off, or the inventory made out.

It is better, when it can be done conveniently, to keep each parcel of goods separate: But sometimes we may be obliged to mix goods of the same kind, purchased from different hands, or at different times, and sell them promiscuously. In that case, the quantities in the different parcels must be added in the book of wares, and sufficient room reserved under the titles for that purpose.

§ 21. It is unnecessary to extend the sales on credit to the column reserved for them till the end of the month; and, if any of them be paid within the month, the payment may be mentioned at the foot of the article, and the sum extended to the cash-column.

If the retailer determines not to book the ready-money articles at all, the money drawn each day must be kept in a drawer, or *till*, and reckoned in the evening. The sum is entered at once in the day-book; and the books, in other respects, may be kept according to the foregoing directions.

§ 22. The following materials may serve as an exercise on this subject. It will not be improper for the teacher to cause them be

extended, at first, in a form where none but personal accounts are kept in the ledger, and to add afterwards what is necessary for a regular balance. Thus the learner will perceive that, by a few hours additional writing in a year, every purpose of regularity is answered; the gain or loss exhibited; and an accurate check obtained for the whole.

Substance of the Invoice Book.

INVENTORY. Mullins, 59 yds. at 13s.; 68, at 12s.; 145, at 10s.; 36, at 9s. Printed calicoes, 168 yds. at 2s. 6d.; 105, at 3s. 2d.; 85, at 3s. 8d.; 28, at 4s. 9d.; 17, at 5s. 4d. Lawns, 96 yds. at 2s. 6d.; 108, at 3s.; 68, at 3s. 4d. Gauze, 62 yds. at 2s. 6d.; 48, at 2s. Ribbons, 5 ps. 12 yds. each, at 5d. per yard; 7—12, at 6d.; 4—12, at 9d.; 2—12, at 10d. Silk handkerchiefs, 36, at 4s.; 17, at 4s. 6d. Lace, 12 yds. at 8s.; 15, at 6s. 6d.; 50, at 5s.; 12, at 4s. Chip-hats, 24, at 1s. 6d.

From *William Dewar*, Linlithgow, dated 31 Dec. 6 doz. men's gloves, at 1s. 3d.; 6 women's ditto, 1s. 5d.; 2 ditto, 1s. 8d.

From *D. Arrot*, for ready money, 9 Jan. 6 dozen hose, at 3s. 2d.; 4 ditto, 3s. 9d.

From *Baker and Co.* London, 15 Jan. 30 yds. Persian, at 1s. 4d.; 42 yds. alamide, at 2s. 9d.; 65 ditto, at 2s. 4d.

From *Baker and Co.* London, 25 Jan. 36 yds. flowered silk, at 19s.; 48 yds. plain ditto, at 14s.; 57 ditto, at 13s.; box and charges, 5s. 6d.

From *William Tenant*, Manchester, 26 Jan. 125 yds. durant, at 1s. 2d.; 149 ditto, at 1s. 3d.; 125 serge, at 1s. 4d.

From *J. Ingram and Co.* Glasgow, 10 Feb. 60 yds. ribbons, at 5d.; 105, at 6d.; 144, at 9d.; 144, at 10d.

From *W. Burn*, Alnwick, 8 Feb. 24 superfine hats, at 17s. 6d.; 24 second ditto, 15s.; 36 coarse ditto, 10s.; 12 childrens ditto, 6s.

Of the Day-book.

Debts due to me: A Brown, merchant Edinburgh, L. 15 : 3 : 9; D. Bruce, writer in Edinburgh, L. 32 : 7 : 6; Ja. Simson, Edinburgh, L. 11 : 3 : 4; Miss Primrose of Aiton, L. 2 : 3 : 7; James Brisbane of Dunnipace, 11s. 3d.; Will. Pirrie, Leith, 18s. 4d.; Brown and Oliver, Dalkeith, L. 14 : 7 : 9; R. Kinnear, Leith, 16s. 9d.; Mrs Miller, Edinburgh, L. 1 : 5 : 6; cash in hand, L. 35.

Debts due by me: To John Miller, Edinburgh, L. 15 : 7 : 8; Ja. Baker and Co. London, L. 154 : 3 : 9; D. Johnson, London, L. 23 : 15s.; W. Nisbet, Paisley, L. 16 : 7s.; Mansfield, Ramfay, and Co. L. 57 3s. 9d.

January 1st: Cash, 2½ yds. gauze, at 2s. 9d.; 7½ printed calicoe, at 3s. 6d.; 5 yds. lace, at 10s.; Henry Moncrieff, Edinburgh, 3½ yds. muslin, at 14s. 6d.; 12, at 13s. 6d.; 15, at 10s. 6d.—2d, Received gloves from W. Dewar.—4th, Received from Brown and Oliver,

Oliver, in part, L.4 : 4s.—8th, Cash, 14 yds. printed calicoes, at 4s.; $3\frac{1}{4}$ yds. lawn, at 4s.; 1 chip hat, 1s. 10d.; D. Miller, merchant, Leith, 5 pair men's gloves, 1s. 6d.; 6 womens ditto, 1s. 8d.; 3 silk handkerchiefs, 5s. 3d.—9th, Bought hose from D. Arrot, for ready money. Cash, 3 yds. lace, at 8s. Received from James Simson, in full, and from Mansfield, Ramsay, and Co. L.20. Bought, for ready money, W. Scot's bill on Geo. Crawford, London, L.23 : 15s. and remitted the same to D. Johnson.—10th, Mrs Miller, 15 yds. muslin, 13s. 6d.; 3 yds. gauze, 2s. 4d.; Brown and Oliver, 36 yds. ribbons, at 6d.; 24 ditto, at 7d.; 12 ditto, at 10d.; 14 yds. lawn, at 4s.; 6 silk handkerchiefs, at 4s. 9d.; 1 chip hat, 1s. 10d.; discount 5 per cent.—15th, Cash, 3 yds. lawn, at 3s.; Miss Primrose, 3 yds. ribbon, at 11d.; $2\frac{1}{4}$ yds. muslin, at 14s. 6d.; 2 pair gloves, 2s.—17th, D. Robertson, Ratho, $6\frac{1}{4}$ yds. printed calicoe, 3s. 6d.; 1 pair hose, 4s. Received from J. Brisbane in full.—19th, Captain Hay of Norton, 2 silk handkerchiefs, at 4s. 9d.—20th, Cash, 15 yds. muslin, at 13s. 6d.; Mrs Stark, Edin. 5 yds. lace, at 10s.; 5 ditto, at 8s. 6d.; 5 ditto, at 7s. Paid William Nisbet in full.—21st, Henry Hume, writer Edinburgh, 2 pair gloves, at 1s. 6d.; 2 pair hose, at 4s. 6d.—22d, Received from Mansfield, Ramsay, and Co. their bill on Hog and Kinloch, and remitted the same to J. Baker and Co. L.73 : 14s.—23d, Cash, $\frac{3}{4}$ yds. printed calicoe, at 4s.—25th, Received from W. Pirrie, in full, 18s.; abated the balance; Mrs Miller, 1 pair gloves, 1s. 8d.—26th, Cash, $1\frac{1}{4}$ yds. gauze, at 2s. 9d.; $23\frac{1}{4}$ at 2s. 4d.; D. Miller, $6\frac{1}{2}$ yds. muslin, at 11s. 4d.—27, Received goods from Baker and Co.—28th, Miss Primrose, 1 silk handkerchief, 5s. 3d.; 2 yds. lawn, at 4s. Cash, 1 chip hat, 1s. 10d.; Mrs Moncrieff, milliner Edinburgh, $2\frac{1}{2}$ yds. gauze, at 2s. 9d.; Mrs Miller, $3\frac{1}{4}$ yds. Persian, 1s. 6d.; D. Robertson, 1 silk handkerchief, 4s. 9d.—29th, Cash, $7\frac{1}{2}$ yds. printed calicoe, at 3s. 6d.; $3\frac{1}{2}$ yds. ribbon, at 7d.; Mrs Moncrieff, 2 yds. muslin, at 10s. 6d. Paid Mansfield, Ramsay, and Co. L.20.—30th, Henry Home, $7\frac{1}{4}$ yds. gauze, at 2s. 7d.; Ja. Simson, $5\frac{1}{2}$ yds. muslin, 11s. 4d. Received from A. Brown, in part, L.5 : 5s.—31st, Received from H. Moncrieff, in full, L.18 : 6s.; abated the balance. Paid charges this month, L.1 : 3 : 9; expences, L.6 : 4s.

February 1st, Cash, 15 yds. muslin, at 13s. 6d.; 7 yds. ribbons, at 6d.; $9\frac{1}{4}$, at 7d.; $15\frac{1}{2}$, at 10d.; Captain Maitland, 12 yds. printed calicoe, at 15s. 2d.; $4\frac{1}{2}$ yds. muslin, at 11s. 4d.; $3\frac{1}{2}$, at 13s. 6d. Received from Miss Primrose, in part, L.4.—4th, Received silks from Baker and Co. Cash, 2 silk handkerchiefs, at 4s. 9d.; 10 yds. lace, at 7s.—5th, Received goods from W. Tenant, Manchester. Miss Primrose, 7 yds. flowered silk, 21s.; 7 ditto plain, 14s. 8d.; 1 chip hat, 1s. 10d.—6th, Brown and Oliver, 52 yds. lawn, at 3s. 8d.; 32 serge, 1s. 10d.; 32 durant, 1s. 9d.; discount 5 per cent.; received from Mrs Moncrieff, in full, L.1 : 7s.; paid Mansfield, Ramsay, and Co. L.25.—9th, Right Honourable Earl of Angus, 2 pair gloves, at 1s. 6d.; 2 silk handkerchiefs, 5s. 3d. Re-

ceived from Miss Primrose L. 3 : 3s.; Mansfield, Ramsay, and Co. have paid W. Dewar's bill on them on my accout, in full.—10th, Capt. Maitland, 1 pair gloves, 1s. 6d. Received from Capt. Maitland in part, L. 8. Cash, $15\frac{1}{2}$ yds. printed calicoe, at 5s. 2d.; $3\frac{1}{2}$ ditto, 6s.—12th, Captain Hay, $7\frac{1}{2}$ yds. plain silk, 15s. 9d. Received ribbons from J. Ingram and Co. Received from Brown and Oliver in part, L. 10, and from Mrs Stark, R. Kinnear, D. Robertson and Henry Hume, in full. Miss Primrose, $7\frac{1}{2}$ yds. muslin, 11s. 4d.; $2\frac{1}{2}$ yds. gauze, 2s. 4d.; $3\frac{1}{2}$ yds. alamode, 2s. 7d.; 15 yds. ribbons, 11d.; 5 yds. lawn, 3s. 8d.; 6 yds. lace, 8s. 6d.; 1 pair gloves, 1s. 8d.—15th, D. Miller, 7 yds. serge, 1s. 10d.; $6\frac{1}{2}$ yds. durant, 1s. 6d. Paid J. Ingram and Co. in part, L. 10. Mansfield, Ramsay, and Co. have retired my acceptance to John Miller, 14 August, 6 mdt. L. 15 : 7 : 8. Received from D. Bruce, in full, L. 32 : 7 : 6.—16th, Cash, $15\frac{1}{2}$ yds. ribbons, at 6d.; 2 yds. lace, 10s. Paid William Tenant, in full, L. 24 : 17 : 3; abated me 1s. 6d. Captain Maitland, 3 pair hose, 4s. 6d.; 3 ditto, 4s. 1 silk handkerchief, 4s. 9d. Received from Miss Primrose, in full, abated 2s.—17th, Received hats from W. Burn, Alnwick. Ja. Brisbane, 3 pair hose, 4s.; 1 pair gloves, 1s. 8. Received from J. Simson, in full. Cash, $2\frac{1}{2}$ yds. alamode, at 3s.; $7\frac{1}{2}$ yds. Persian, at 1s. 6d.—18th, A. Brown, 1 pair gloves, 1s. 6d.; 1 pair hose, 4s.; 1 silk handkerchief, 4s. 9d. Received from Captain Hay, in full, L. 6 : 12s. Paid Mansfield, Ramsay, and Co. L. 10. Cash, 2 yds. ribbons, 7d.; a superfine hat, L. 1 : 1s. Received from the Earl of Angus and J. Brisbane, in full. H. Hume, $5\frac{1}{2}$ yds. muslin, at 11s. 4d.; $9\frac{1}{2}$ yds. printed calicoe, at 2s. 9d.; $3\frac{1}{2}$ yds. lawn, at 3s. 8d.; 1 silk handkerchief, 5s. 3d.; 1 pair hose, 4s.; 1 second hat, 18s.—20th, Brown and Oliver, 22 yds. alamode, at 2s. 7d.; 15 yds. printed calicoe, at 3s. 6d.; 19 yds. serge at 1s. 10d.; discount 5 per cent. Cash, $3\frac{1}{2}$ yds. ribbons, at 10d. Mansfield, Ramsay, and Co. have remitted Baker and Co. their bill on Hog and Kinloch, on my accout, 30 ddt. L. 32 : 15s. par.—21st, Paid Mansfield, Ramsay, and Co. L. 10. Cash, superfine hats, L. 1 : 1s.; $9\frac{1}{2}$ yds. ribbons, 10d.; 7 pair womens gloves, at 2s; 1 silk handkerchief, 4s. 9d.—23d, Paid Mansfield, Ramsay, and Co. L. 20, and settled accout, interest, and commission, at $\frac{1}{4}$ per cent. being charged.—25th, A. Brown, 12 yds. flowered silk, at 21s.; 67 yds. serge, at 1s. 10d.; $15\frac{1}{2}$ yds. Persian, at 1s. 6d.; 17 chip hats, at 1s. 10d.—28th, Received from Brown and Oliver, in part, L. 6. Paid Baker and Co. bill on me to A. Smith, L. 6 : 16 : 9. Paid charges this month, 15s. 9d.; expences L. 3 : 10s.

§ 23. Some shop-keepers use no ledger, nor any other book, besides a day-book, and perhaps an invoice-book. When the far greater part of the goods is sold for ready money, this method may answer pretty well, provided abstracts may be made monthly, or oftener, of all the articles sold on credit. A list of the debts owing, when

when the books are opened, is prefixed to the day-book; and a list of the debts which arise from the sales each month, is prefixed to the succeeding month. Against these lists, a column should be reserved for marking the payments, whether in whole or in part; and, once in three months or oftener, a complete list of the debts should be drawn out, by abstracting the outstanding articles from the lists of the particular months.

The following is a complete list of the debts due at the end of January, in the former specimen; and the payments to the end of February, are marked on the margin.

	A. Brown	L. 9 18 9
Febr. 14th, in full	D. Bruce	32 7 6
17th, in full	Ja. Simpson	3 2 4
1st, L. 4.—9th, L. 3: 3s.—16th, in full	Miss Primrose	4 15 7½
12th, L. 10.—28th, L. 6	Brown and Oliver	16 10 7½
12th, in full	R. Kinnear	— 16 9
	Mrs Miller	12 1 6½
	D. Miller	5 4 1
12th, in full	D. Robertson	1 10 7½
18th, in full	Captain Hay	— 9 6
12th, in full	Mrs Stark	6 7 6
12th, in full	H. Hume	1 10 8½
6th, in full	Mrs Moncrieff	1 7 10½
		L. 96 3 5½

The payments made by the shop-keeper, for the goods he purchases, may be marked in the invoice-book, at the foot of the respective invoices: And it will be easy to abstract from it a list of the debts he owes.

§ 24. We shall propose another method, adapted for the use of those who deal only in a few articles. It requires a day-book, a sales-book, and a ledger. All occurrences, except sales, are entered in the day-book. The sales-book is made in a broad form, and ruled with a variety of columns, for the quantity and value of the goods sold; a set of columns being allotted for each kind, in the form exhibited Part III. § 67, and two columns besides; one for extending for the ready-money sales, and the other for those on credit. These columns may be continued through both pages of the folio, which is to be considered as one sheet. The articles are entered on the left-hand part of the book, during the hours of business, and the sums extended to the proper columns, at leisure-hours. At the end of the month, the columns are added.

The ledger is kept in the regular manner of double entry, and contains an accompt for every kind of goods. The articles sold on trust are posted to the Dr. of the purchaser's accompt, from the sales-book, and the ready-money sales are posted once a month on the Dr. of the cash-accompt, from the sum of the cash column in the

the sales-book. Then the quantity and value of goods of every kind is posted on the Cr. of the account of goods, from the sum of the corresponding column in the sales-book. These entries, which would be too tedious in the common method, are rendered easy, by the form of the sales-book; for the same kind of goods may be sold to an hundred different purchasers in the course of a month; and, if the sales were entered in a common day-book, it would require as many entries in the Cr. of the account of goods as there were articles sold. But when the amount of the sales is collected, in the columns of the sales-book, it requires only one article each month, on the Cr. of each account of goods. This method, with little additional trouble, exhibits a very distinct state of the business, and distinguishes the gain or loss on every kind of goods.

C H A P. V.

TRADESMENS ACCOMPTS.

§ 25. **A**RTIFICERS and manufacturers sometimes keep only a day-book and ledger; the former, for entering goods sold, or work done on credit; the latter, for personal accompts: And perhaps a cash-book and an invoice-book.

A more complete method is necessary for exhibiting the materials used, the work done, and the profit acquired. The subsidiary books most useful for these purposes are,

I. A BOOK of MATERIALS, where the quantities purchased and consumed are entered in separate parts, or on opposite pages.

II. A BOOK of WORK, where the quantities of materials delivered to journeymen, the quantities of wrought goods received in return, the dates of the delivery and return, the value of the materials and wages; and the value of the wrought goods are entered in separate columns.

If the business consists in any operation performed on goods belonging to others, this book must contain columns for the quantities received from our employers, the work done, and the delivery of the goods when improved or converted, the charge, and, perhaps, for the payment. By this means, it will be a check upon the ledger, and may sometimes supply the place of one.

Several books of this kind will sometimes be needed. The exact form must be regulated by the nature of the articles.

III. A BOOK of WAGES, which contains the names of the journeymen and other servants employed, the work they are employed at, the number of days, and rate per day, if they be paid by days-wages, or the quantities of work done, and rate, when paid by

by the piece. It may be filled up once a-week, or oftener, if necessary.

In some trades, it may be convenient to keep the book of wages in the form of a ledger, and allot an accompt for each journeyman, where the quantity and value of the work he performs is entered.

§ 26. The principal books are,

I. The JOURNAL, which contains the Purchases, Sales, and the like; and a Monthly Abstract of the quantity and value of work manufactured.

II. The LEDGER, which, besides personal accompts, should contain,

Accompts of Stock, Profit and Loss, and Cash.

Accompts for the different branches under which the expence of the business may be distributed, as, materials, wages, upholding of machinery, rents, excise, incident charges, &c.

A general accompt of the trade or manufacture. To the Dr. of this accompt, the balances of the accompts of materials, and other expences, are transferred at the end of the year; on the Cr. the value of goods manufactured each month is entered. The balance shows the gain or loss, allowance being made for the value of goods not yet completely manufactured, and therefore not entered on the Cr.

One or more accompts for manufactured goods, where the quantity made is entered monthly on the Dr. and the monthly sales on the Cr. These accompts will balance by the value on hand, if the prices be constant; but, if the prices vary, the balance, compared with the value on hand, per inventory, will show the gain or loss by the alteration.

The ledger is posted, by double entry, from the journal.

These general directions will be useful in most kinds of trades and manufactures; they will answer every purpose of regularity and information, and do not require much writing that can well be spared. Their particular application, and the number and form of the subsidiary books, will be different, according to the nature and extent of the business.

§. 27. When a person is engaged in several branches of manufacture, whether on different materials, or on the same materials through several successive stages, he should keep his books in such a manner as to exhibit the gain or loss on each.

Take the example of a linen manufacturer who purchases or imports rough flax, dresses it by his own servants, and sells such kinds as do not suit his purpose; delivers the rest to be spun, and receives the yarn from the spinners; weaves part in his own work-house by journeymen, and delivers the rest to other weavers; gives out the linen to be bleached, and receives and sells it when white.

If all these branches of business were necessarily connected, and the

the manufacturer had no other choice than to purchase the rough flax, and carry on the successive operations, it would be sufficient to keep his books in a form that should exhibit the gain or loss on the whole; but if he has an opportunity of beginning or desisting at any stage of the manufacture, his books should exhibit the gain or loss on each operation separately. He may purchase dressed flax or yarn; he may sell the linen before it be bleached; and, since he chooses to unite the several trades of flax-dresser, spinner, weaver, and bleacher, it is proper he should have a separate view of the success of each. This is the leading principle by which his books should be regulated.

C H A P VI.

LAND-STEWARDS ACCOMPTS.

§. 28. **T**HE object of a land-steward's accompts is to exhibit the rental of the estate under his management; the public burdens attending it; the payments of money or corn received from the tenants; the arrears owing; the sales of corn, or delivery of the same to the proprietor; the expence and produce of the ground in the proprietor's natural possession; and the debts and credits arising from the affairs under his management.

The rental should be drawn out in the most distinct form, and renewed as often as new leases are granted, or other circumstances require.

The journal should contain an entry of every thing received, delivered, or transacted. It may either be expressed in the natural style of narration, or in the form of Dr. and Cr.

The ledger should be kept on the principles of double entry, tho' the form need not be rigidly observed. It will contain an accompt for the manor or estate; on the Cr. of which, the arrears due by the tenants, the corns, or other articles on hand, and debts owing by others, are entered, when the books are opened. If any debts be owing by the steward on his master's account, the extent of the same is entered on the Dr. This accompt is analogous to the stock-accompt of a common ledger.

An accompt for the lord of the manor, where the sums of money paid him, and the corn or other articles delivered to him, or to others, by his order, are entered on the Dr.

An accompt for each tenant; on the Dr. of which they are charged with the arrears owing when the books were opened, and the rents that fall due at the respective terms, charged from the rental.

On the Cr. the payments received are entered, and the balance shows the arrears still owing.

A Cash-accompt, and an accompt for every person with whom there are any dealings on credit.

A Corn-accompt. The quantities on hand, or received, are entered on the Dr. the quantities delivered, on the Cr.

An accompt for the farm in the proprietor's own possession, and under the management of the steward. It contains on the Dr. the value of the stock of cattle, &c. and all expences; on the Cr. the quantity or value of its produce, when sold, or sent to the granary and transferred to accompt of corn, or delivered for the use of the family. The balance, when the valuations are affixed, and allowance made for the value of the stock remaining on hand, shows the gain or loss.

If there be woods, fishings, quarries, or the like, on the estate under the steward's management, accompts must be opened for them in the ledger, where the expences and returns are compared, and the profit or loss exhibited.

§ 29. The books may be kept in either of the following methods.

Method First, When corn is received from the tenants, and delivered to the proprietor, it may not be thought necessary to affix a valuation: it is sufficient if the steward render accompt of the quantity received. If the books be conducted on this plan, the inner columns of the accompts for the tenants, &c. are different in kind from those of an accompt of goods in a common ledger. In the one, the value in the money-column refers to the quantities in the inner columns; in the other, there is no valuation affixed to the articles whose quantities are entered in the inner columns; and, if there be any sums in the same line of the money-column, that sum is chargeable, besides the articles entered in the inner columns.

The accompts of the tenants must be ruled with inner columns for every article besides money with which they are chargeable. The proprietor's accompt has inner columns for entering the quantities of each article delivered him; the accompt of corn, for the quantities of wheat, barley, and the other kinds; the farm-accompt, for the quantities and kinds of corn consumed, or received from it; and the accompt of the manor has inner columns corresponding to all those of the other accompts.

The method of posting and balancing the ledger, when the valuations are not affixed, is this:

At the terms when the rent falls due, the sums of money payable by each tenant are entered on the Dr. in the cash-column, and the articles deliverable, in the proper columns; and the amount of the rental is entered on the Cr. of the accompt of the manor, in the same columns.

When the tenants pay their money-rent, the payments are entered on the Dr. of cash, and the Cr. of the tenants money-column:

lumn: When they deliver their corn, it is entered on the Cr. of the proper column, and the Dr. of the same column of the corn account.

Corn received from the farm is entered on the Dr. of the proper column of the account of corn, and on the Cr. of the same column in the farm-account.

Corn delivered by the proprietor's order is entered in the Dr. of the proper column of his account, and on the Cr. of the same column in the corn-account.

In these, and like entries, the entries in the Dr. of the cash-columns have correspondent entries on the Cr. of the cash-columns of other accounts; and the entries on the Dr. of the inner columns, have correspondent entries, under the same titles, on the Cr. of other accounts. Therefore, the sums of the Dr. and Cr. of the whole ledger will be equal both in the inner and outer columns.

But, when wheat, or other corn, is sold, the entry on the Dr. of the purchaser's account is in the cash-column; and the corresponding entry on the Cr. of corn is in the inner column for wheat. In consequence of which, the sum of the Dr. of the cash-columns, through the whole ledger, will be greater than that of the Cr. and the sum of the Cr. of the wheat-columns, through the whole ledger, will be greater than that of the Dr. To prevent this, an abstract must be drawn out of all the articles sold through the year, and their value. The articles sold are entered on the Dr. of the account of the manor, in the inner columns; and the value of these articles is entered on the Cr. of the same account in the cash-column. This restores the balance of both.

If tenants, chargeable with corn, pay money in place of delivering their quantity, the entry must be made as if they had delivered the quantity, and bought it immediately after: If corn, or other articles be bought, the balance must be regulated by entries exactly opposite to those above-mentioned.

§ 30. Method Second. A valuation may be affixed to every article. In that case, some of the inner columns required in the former method may be spared, though those in the tenants accounts, and the account of corn, are still necessary. The sums in the outer columns are regularly opposed to each other, according to the Italian method; and no entries are needed to adjust the balance.

§ 31. If a sum of money, suppose L. 500, be expended to improve the farm, which the proprietor does not expect to draw back in less than 10 years, the whole sum, at the end of the first year, is considered as part of the stock on the farm; but, at the end of the second, when one-tenth part, or L. 50, was expected to be drawn back, the remainder only, or L. 450, should be considered as part of the stock; and this allowance is gradually diminished L. 50 each year,

year, till it be exhausted. If no returns be expected for several years, the allowance is not diminished till the time when benefit was expected. This, however, should be regulated by the hopes entertained when the money was expended, and not by the success of the improvements; and then the balance of the farm-accompt, in the successive years, will show how far the improvements have exceeded or fallen short of expectation.

The farm-accompt may be divided into several subsidiary ones, as Horses, Oxen, Hay, Pasture, Dairy, and the like. This, however, takes a good deal of additional writing, and seems not attended with any suitable advantage.

C H A P. VII.

FARMERS ACCOMPTS.

§ 32. **A**S men of this profession have seldom leisure for much writing, we shall point out a method of keeping their accompts, very concise, yet generally sufficient.

One book may answer both for cash-book and journal. It is kept in the folio form, and ruled with two columns; one for extending the cash, and the other for the credit articles. When corn, or any other article, is sold, the entry is made on the Dr. and extended to the proper column. When payment is received for corn formerly sold, we enter the sum received in the Dr. of the cash-column, and, turning to the entry of the sale, we prefix a cross to it. Articles bought, whether for ready money or on trust, payments of rent, wages, or of articles formerly bought upon trust, are entered in like manner on the Cr.

Once a month, or quarter, a list of all the articles due to us is drawn out, by perusing the Dr. side of the book, and collecting the articles from the credit-column which are not marked with a cross: And a list of the debts we owe is drawn out, in the same manner, from the Cr. side.

§ 33: Once a year we make out a state of the gain or loss as follows: To the sum of the cash-column on the Dr. side, or money drawn from the sale of the crop, we add the amount of debts due to us, and the estimated value of any part of the last crop that remains on hand. If any of the money received this year be in payment of the former crop, the sum of these articles must be subtracted. Thus we obtain the value of the crop. Then, to the sum of the cash-column, on the Cr. side, or amount of expence, we add the debts due by us, and subtract from the amount any sums that were paid for debts contracted before the present year. Thus we

obtain the expence of raising the crop; and this, compared with its value, shows the gain or loss. But, if the value of the stock be increased or diminished, or money be sunk for improvement, allowance must be made for it, as directed § 31.

§ 34. A CORN-BOOK may also be kept, in the folio form, and ruled with columns for wheat, barley, and other kinds; or, if more agreeable, a separate folio may be allotted for each kind. The quantities received from the barn are entered on the Dr; the quantities sold, or sown, or consumed by the farmer's family, servants, and cattle, on the Cr. If part be manufactured into meal, the quantity of corn sent to the mill is entered on the Cr. of the corn-column; and the meal received in return, on the Dr. of a column reserved for meal.

If the dealings on credit be numerous, a regular ledger will be necessary.

§ 35. Besides these books, which contain the state of affairs, the intelligent husbandman will choose to keep others for recording the progress of his operations, and exhibiting the success of his management. This requires,

I. A JOURNAL of WORK, where the labour performed each day is entered, specifying the field, and the number of men and horses employed. Along with this may be kept a register of the weather.

II. A FIELD-BOOK, where several pages are allotted for each field, and ruled with two columns, for extending the sum of the expences, and the produce. The rent, seed, manure, ploughing, reaping, and the number of sheaves, quantity of corn, and value, are entered from the journal of work, or the corn-book. The register of the same field, in successive years, is continued from page to page, that the success of the different manures, rotations, and methods of treatment, may be easily compared, and a judgment formed of the whole, when continued for a sufficient length of time. The following is a specimen:

No. 1. WESTFIELD, Soil light loam.				Expence.			Produce.		
				L.	s.	d.	L.	s.	d.
1772	10 Acres, rent 30s. L. 15								
	FALLOW.								
Jan.	20. to 24.	12 yokings ploughing							
May	18. to 21.	10 ditto ditto							
	30.	2 ditto harrowing							
June	15. to 18.	10 ditto plowing across							
	20.	3 ditto harrowing							
		37 yokings at 2s	- -	L.	3	14	-		
		100 loads dung at 3s.			15	-	-		
		200 bushels lime at 2s.			20	-	-		
		Carried forward					38	14	-

				Expence.		Produce.	
				L.	s. d.	L.	s. d.
				Brought forward		38	14 —
WHEAT.							
Aug. 15. to 19.	10 yokings ploughing						
20. 21.	2 yokings harrowing						
				12 yokings at 2s.	L. 1	4 —	
20. 21.	Sown 4 quarters, at 42s				8	8 —	
Oct. 15.	draining				—	4 —	
1773.							
Mar. 12.	weeding				—	6 8	
Aug. 1. to 5.	reaping, at 5s. per acre				2	10 —	
						12	12 8
				110 threaves wheat			
Nov. 20.	40 quarters at 42s.						84 —
				4 qrs. per acre			
				10 returns per feed			
BARLEY.							
Oct. 1. to 4.	11 yokings ploughing						
Mar. 15.	10 ditto ditto						
Apr. 1.	2 ditto harrowing						
15. to 18.	9 ditto ploughing						
19.	2 ditto harrowing						
				34 yokings at 2s	L. 3	8 —	
19.	sown 5 qrs. barley at 25s.				6	5 —	
20.	breaking clods				—	15 —	
1774.							
Aug. 8.	reaping at 5s. per acre				2	10 —	
						12	18 —
				150 threaves barley			
Dec. 1.	28 quarters barley at 24s.						33 12 —
				2.8 qrs. per acre			
				5.6 returns per feed			
HAY.							
				1 qr. 4 bush. ryegrass sown with			
				the barley, at 4s. per bushel	L. 2	8 —	
1775.				200 lb. clover-feed at 6d	5	— —	
June 1.	mowing at 2s. per acre				1	— —	
20.	winning and stacking				2	10 —	
						10	18 —
Sept. 30.	32 loads hay at L. 1 : 5s.			L. 40	— —		
				3.2 loads per acre			
				12 oxen pastured on the foggage			
				6 weeks, at 2s. per week		7 4 —	
						60	— —
				four years rent			47 4 —
						135	2 8 164 16 —

In this specimen there is exhibited the success of a rotation of wheat, barley, and hay, after a fallow and plentiful manure. Some might prefer an arrangement of the articles under different columns, as more systematic; but the variety of particulars is so great, that the above will be found more convenient for its simplicity. The straw is supposed to answer for carriage and threshing; if otherwise, the value of both may be inserted. The last ploughing in the first season is not included among the expences of fallow, as it would have been required though no fallow had been given. Thus,

the expence of the fallow, and of each succeeding crop, is separately collected.

A yoking is the work performed by one man and two horses or cattle. If four horses be yoked in the plough together, and 2 men employed, this must be reckoned two yokings; and a like proportion for a greater or less number. There are generally two yokings a-day in summer, and one in winter. To ascertain the expence of a yoking, add the charge of maintaining and upholding the cattle, the purchase and repairs of ploughs, harrows, harness, &c. and divide the sum by the number of yokings in a year; to the quotient add the daily wages of the servant, and the sum is the expence per yoking. The number of yokings in the year will be found from the journal. If the servant be paid by the year, his wages and maintenance may be divided by 300, allowing 65 days for Sundays, holidays, and accidents. The expence of reaping an acre is computed by dividing the whole expence of the harvest by the number of acres.

§ 36. We shall conclude this PART by proposing a few cases for a trial of the learner's skill in inventing suitable forms of book-keeping.

I. A society of merchants raise a stock of L.40,000, for carrying on the business of banking. The stock is divided into 100 shares of L.400 each, and any partner may hold one or more, not exceeding five, and may transfer them under certain restrictions. They circulate their own notes by lending money on cash-accompts, or by discounting bills. In this last, they observe a rule, that they will not discount beyond a certain sum on bills, where the same person is bound either as drawer or acceptor. The business is conducted by directors, chosen annually at a general meeting of the partners, and by proper officers under them. They balance their books, and divide their profits, once a year. Required a proper form for their accompts?

II. Required the best form for conducting the books of societies for the benefit of widows or the aged, or for insurance of lives? The purposes of these societies is explained Part II. § 122, &c.

III. Required a proper form for an insurance-broker's books? The nature of that business is explained § 107. note S.

IV. A bleacher takes in linen at his field, and employs agents at several towns in the neighbourhood for the same purpose. Required a form of conducting his accompts, which, besides containing the value of the work done at the field, and the expence, will exhibit the quantities received from, and returned to each agent, and the quantities from each, still on hand; also, a comparison of the expence on the coarser and finer kinds, to assist the proprietor in judging whether the prices affixed to the different kinds be in due proportion to the charge?

V. A

V. A brewer purchases barley, and converts it into malt; he also occasionally purchases and sells malt; he carries on the different branches of strong ale, small-beer, and porter-brewing; and desires a form of book-keeping that shall exhibit his expence and sales, his debts and credits, the quantities of malt obtained from barley, the quantities bought, sold, or consumed, the quantities of beer of different kinds obtained from malt, and compared with the price of the barley, and a comparison of the profit on the different branches of his business.

VI. Required a scheme of book-keeping for the linen manufacturer whose business is described § 27.

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AN
INTRODUCTION
TO
MERCHANDISE,

PART VI.
STATE AND LAWS OF TRADE.

CHAP. I.
STATE OF BRITISH TRADE.

§1. **C**OMMERCE derives its origin from two sources; the natural difference in the productions of different countries, according to the varieties of their soils and climates, their mines and fisheries; and the difference of the industry or skill which the inhabitants exert, in raising, preparing, and manufacturing the materials obtained at home, or imported from abroad. When a commodity is wanted in a place where it cannot be raised, or where the superior expence of raising it is greater than that of importation, trade will naturally take place. If the natives neglect it, foreigners, unless restricted, will interfere, and transport these commodities in shipping of their own, to places where they can be sold to advantage, and sometimes retain them in their own country, to wait a favourable market. Trade, thus conducted, is distinguished by the name of the *Carrying Trade*.

Inland trade depends chiefly on the different employments and commodities of the town and country. The inhabitant of the country raises food for the citizens, and rude materials for their manufacture. In return, he receives a share of the luxuries of the metropolis, and the manufactures of the towns.

§. 2. ENGLAND is situated between 50 and 56 degrees of north latitude, and enjoys a milder climate than countries in the same latitude on the continent. From the fertility of its soil, the convenience of its insular situation, the number of its harbours, the extent of its colonies, the mildness of its government, and constant attention of the legislature, it carries on a most extensive and beneficial commerce. Though the variety in climate be not considerable, the produce of the different counties is not exactly the same; and this diversity opens a copious field for inland commerce. The southern and maritime counties abound most in corn; the northern and inland ones raise the greatest quantities of cattle. The corn is more than sufficient for the inhabitants; their oxen, sheep, and hogs, are large and excellent. Considerable quantities of a smaller breed of oxen are brought from the mountains of Wales and Scotland, and fattened in the English pastures; and some are imported from Ireland. With this supply, the quantity is sufficient for the inhabitants, who subsist more on animal food than any other civilized nation, and for victualling our fleets, and the merchant shipping in our ports, both British and foreign. Hops are most plentifully produced in Kent, Surrey, and Hampshire; apples, for cyder, in Herefordshire, Devonshire, and Worcestershire; woad, for dying, in Bucks and Bedfordshire; saffron in Essex; liquorice in Yorkshire; timber for the navy in the counties along the channel. The tin-mines of Cornwall and Devonshire are the best in the world, and the most ancient article of British commerce. Lead is obtained in Yorkshire, and other places, in such quantities, as to form an article of export: But our copper is not sufficient for our own supply. Coals are obtained in greatest quantities in the counties of Northumberland, Durham, and Lancashire. London is plentifully supplied with that necessary article from Newcastle; and this branch gives employment to 10,000 mariners, lighter-men, coal-heavers, and boatmen. The fishings in the rivers, and on the coast of England, afford a considerable supply of food to the inhabitants; but the quantity exported is inconsiderable, and consists chiefly of red-herrings, salmon, pilchards, and oysters.

The chief manufacture is that of woollen-cloths and stuffs. The number of fleeces annually shorn is upwards of 12,000,000. The fine broad cloths are manufactured in the southern counties; coarser and slighter stuffs in the northern ones. The manufactures of cotton has of late years been established at Leeds and other places to a great extent. Next in importance is the hardware manufactures of Birmingham, and the cutlery of Sheffield. The linen manufactory is not sufficient for home-consumption. That of silk, at Spittlefields, though founded on a foreign material, is considerable. We may mention the gold and silver manufactures, the sugar-houses, the porter-breweries of London; the glass manufactures of Bristol and Newcastle; the earthen-ware of Staffordshire; the silk-mills at Derby; the manufactures of paper, carpets, hats, stockings,

ings, leather, shoes, saddlery, cordage, great guns, and military stores. The extensive domestic trade, occasioned by the exchange of these articles, is partly carried on coastways; in a few places it is facilitated by navigable rivers; in others, by artificial canals; in all, by excellent high roads, and exemption from internal imposts or restrictions.

§ 3. SCOTLAND is situated between latitude 55° and 59° N. and the northern islands extend so far as 61° . It is inferior to England in fertility, and does not produce wheat sufficient for its own subsistence; but, in favourable seasons, it has an overplus of barley and oats. The fisheries of salmon, of lobsters, the herring-fishery, chiefly on the western coasts, and that of cod and ling, among the northern islands, afford large quantities for export.

The principal manufacture is that of linen, in various branches. Other considerable manufactures are those of silks and silk-gauzes, at Glasgow and Paisley, stockings at Aberdeen, thread at Aberdeen and Dundee, and cast iron at Carron.

Scotland receives from England, wheat, hops, broad-cloth, woollen stuffs, silks, hats, hardware, earthen-ware, porter, East-India goods, sugar, and various other articles. The returns are black cattle, fish, coal, linen, and linen-yarn.

The chief articles exported from Scotland to foreign countries are coal and lead, to Holland and the Baltic; salmon, to most countries in Europe; herrings, to the West Indies; linen manufactures, to America.

§ 4. IRELAND is situated between 51 and 56 degrees north latitude. The soil is perhaps equal in fertility to that of England, but not cultivated to the same perfection. The pastures are rich, and sustain vast quantities of black cattle and sheep. Hemp and flax are raised plentifully in the northern counties. Potatoes abound every where, and form the common food of the lower people.

The imports to Britain are, cattle, horses, hides, skins, tallow, beef, pork, butter, cheese, candles, soap, wool and woollen-yarn, linen and linen-yarn, rape-feed, and copper-ore.

The exports are, iron, steel, tin, alum, salt, and coals; hops, bark, beer, and cyder; calicoes, silks, muslins, and millinery wares, fustians, cottons, and cotton-yarn, paper, hats, and beaver; furniture, glass, hardware, earthen wares, drugs, and colours; pepper, tea, spices, tobacco, coffee, sugar, whalebone, pitch, tar, wine. The quantity of provisions exported from Cork to the colonies, and other places, is very great.

§ 5. Before the fifteenth century, the foreign trade of Britain consisted in the exportation of 30000 bags of wool, valued at L. 15 of our present money, and some leather, tin, and lead, mostly to Germany and the Low Countries. Since the reign of Henry VII.

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it has gradually enlarged in the quantity and variety of articles, and the number of countries resorted to. Our commercial connections are now extended to almost every maritime nation. Our imports generally consist of native produce; and the articles depend on the situation of the country. Those which lie beyond latitude 55° do not produce corn enough for their own subsistence, and their exports consist of timber, metals, and fish. The countries near the polar circle afford furs; and the adjacent seas are resorted to for their whale-fisheries. Wheat ripens from latitude 57° , southwards, to the tropic; oats a few degrees further north; hemp and flax are mostly raised between 50° and 58° . The vine brings its fruit to perfection in 52° , and the wines made from that latitude to 45° are most esteemed, though inferior in strength to those of more southerly climates. A situation some degrees nearer the sun is necessary for olives, oranges, and like fruits, and for propagating the silk worm to advantage. The tropical countries, though abounding more in fruits than grain, are exceedingly fertile in rice, where the land is marshy, or can be laid under water: But their trade is chiefly supported by spices, sugar, and other articles, that require so warm a situation to be brought to maturity.

§ 6. DENMARK, which consists of a peninsula annexed to Germany, and some islands in the Baltic, extends from 54° to 58° N. The climate is temperate, in respect of the situation; and the country, tho' not very fertile in corn, affords good pastures, from which considerable quantities of cattle are sent to Germany.

Norway, which extends from 58° to 72° N. is a mountainous and barren country, but affords some articles for trade in its woods, mines, and fishings. The Danes also possess Greenland and Iceland, in the northern Ocean; Christianburgh, on the coast of Guinea; Tranquebar, in the East Indies; and the islands of St Thomas and St Croix, in the West Indies.

The imports to Britain are, iron, timber, deals, masts, tar, and stock-fish. The exports are, bullion, lead, coal, leather, hardware, earthen-ware; a few linens, woollen-stuffs, and wrought silks; tobacco, indigo, cochineal, rice. The imports amount to L.83,000, the exports to L.158,000.

§ 7. SWEDEN extends from 56° to 60° N. The country is, in general, unfertile in corn, but abounds in valuable mines, some of silver, copper, and lead, but chiefly of iron. The Swedes were so deficient in skill in the 16th century, that their iron-ore was sent to the Hanse-towns to be smelted; but now they employ upwards of 400 forges, besides slit-mills, flatting mills, foundaries, &c.

The imports to Britain are, iron, to the extent of two-thirds of our whole consumpt, fir-deals, masts, tar, pitch. The exports are, bullion, tin, brass, coals, hard-ware, woollen-stuffs, cotton,

hosiery; tobacco, sugar, pimento, and drugs. The value of the imports is about L. 184,000, and the exports near L. 50,000.

§ 8. POLAND and PRUSSIA extend from 46° to 57° N. These countries abound in excellent pastures, forest-trees, and mines; particularly the salt mines near Cracow, which are sufficient for the supply of all Europe; but their chief riches is in corn.

The imports to Britain are, wheat, rye, flax, timber, deals, masts, staves, pitch, tar, potashes, furs, feathers, tallow, bees-wax, honey, yarn. The exports are, brass, lead, tin, alum, hops, malt, leather, woollen-cloths, stockings, hats, sail-cloth, earthenware, hardware, glass; cinnamon, coffee, ginger, tobacco, sugar. The value of the imports has sometimes exceeded L. 300,000, and, in general, exceeds L. 200,000. The exports are above L. 150,000.

§ 9. RUSSIA extends from the polar circle to the Euxine Sea, from 72° to 47° N. This extensive country comprehends a variety of climates of very different fertility, but scarce any where fully inhabited, or properly cultivated. The exports from Russia amount to four millions of rubles, the imports to three millions. Besides which, Russia carries on a land-trade, by caravans, with China, for tea, cotton, silk, and gold; and with Persia, by Astrachan, across the Caspian sea, for raw and wrought silk.

The imports to Britain are, hemp, flax, iron, timber, potashes, lint-feed, rhubarb, furs, leather, tallow, train-oil, hogs-bristles, bees-wax, linen, linen-yarn, sail-cloth. The exports are, tin, lead, alum, woollen-cloths, calicoes, hosiery, cannons and shot, cutlery, tobacco, pepper, cochineal, indigo. The imports, which did not amount to L. 100,000 fifty years ago, are now near L. 1,000,000, and the exports upwards of L. 130,000. The Russia company had formerly exclusive privileges, but now the trade is free to all, on payment of L. 5 for admission.

§ 10. The UNITED NETHERLANDS are situated between latitude 51° and 54° N. The country is low, defended against irruptions of the sea by strong dikes, and intersected by navigable canals, which contribute much to the convenience of commerce. It is the most populous and best cultivated country in the world; and, as the extent of territory is too small for the subsistence of the inhabitants, their dependence is on foreign trade; in which, by industry and frugality, they have been able to outlive every other nation. Most of the East Indian islands are under their dominion, and they have factories on both coasts of Indostan. These settlements supply the spices of cinnamon, cloves, and nutmeg, to all the world. They possess the islands of Eustatia and Curassou in the West Indies; Surinam, on the continent of South America; the Cape of Good Hope, and some settlements on the coast of Guinea, in Africa. Their herring-fishery has been a most extensive fund of wealth; and their whale-fishery is conducted with a success superior

rior to that of other nations. Amsterdam, situated on the Zuider Zee, is the first trading city in Europe, and, from its extensive intercourse with other countries, has become the central place for transacting bills of exchange. Though the country itself produces but little for foreign commerce, its ware-houses are so well supplied, that it serves, in many articles, as a general magazine for Europe.

The imports to Britain are, quicksilver, argol, madder, flax, lint-seed, grafs and garden-seeds, whale-fins, train oil, colours, geneva, drugs, spices, linen, thread, tape, lace, and toys. The exports are, coals, brass, wrought iron, skins, yarn, calicoes, muslins, printed linen, broad-cloth, stuffs, mohair, logwood, rice, ginger, coffee, India and Turkey goods. Corn is sometimes an article of export, sometimes of import, as our plenty or scarcity requires. The value of the imports, at a medium, is L.420,000, but, in the year 1767, they amounted to L.740,000. The exports amount to L.1,800,000.

The remaining ten provinces of the Netherlands, now subject to the Austrians and French, are situated between 49° and 51° N. The exports to Britain are, linen, cambric, lace, thread, tapestry, incl. The imports are, iron, tin, lead, litharge, woollen-stuffs, calicoes, cotton, wool, Brazil wood, pymento, tobacco, sugar, and India goods. The imports, at a medium, amount to L.130,000, the exports to L.650,000.

§ 11. GERMANY is situated between 45° and 55° N. latitude. The country is, in general, fertile, but abounding with forests, and not fully cultivated. It is supplied with navigable rivers, which penetrate to the heart of the country; but commerce is discouraged by the variety of interfering states, and the restrictions and impositions at the different frontiers.

The exports to Britain are, alum, steel, tin, smalt, timber, waincoat, boards, ashes, grain, seeds, madder, Rhenish wine, goat-skins, linen of various kinds, linen-rags. The imports are, lead, coals, tin, wrought iron, train-oil, Sheffield and Birmingham manufactures, woollen-cloths, calicoes, printed linens, logwood, tobacco, pymento, rice, pepper, ginger, drugs, coffee, and refined sugar. The imports amount to L.645,000, the exports to L.1,500,000, and, in some years, have exceeded L.2,000,000.

The Hanse towns were a powerful confederacy, for the purposes of trade and defence, whose number, in the fifteenth century, amounted to eighty. The chief were, Lubeck, Hamburgh, Cologne, Brunswick, and Dantzick.

§ 12. FRANCE is situated between latitude 42° and 51° N. It produces abundance of corn and wine, and some silk, in the southern provinces, but not sufficient for its own supply. The wines of Champaigne and Burgundy are most esteemed, but the claret wine

wine of Guienne is exported in greater quantity. The chief manufactures are, silk, lace, fine thread, glass, and paper.

France possesses the island of Martinico, Guadaloupe, part of Hispaniola, and some others in the West Indies; the fort of Goree on the coast of Guinea; the isles of France and Bourbon in the Indian Ocean; and some settlements on the coast of Indostan.

The imports to Britain are, wine, brandy, linens, lawns, lace, cambrics, brocades, velvets, millinery wares, and paper. The exports are, corn, coals, alum, lead, hardware, horn, plates, flannels, tobacco, and wool clandestinely. As the trade with France has been much restricted by high duties and prohibitions, and much of it carried on in a clandestine manner, the extent cannot be ascertained from the custom-house books. A more liberal system is now established.

§ 13. SPAIN is situated between latitude 36° and 44° N. The country, though mountainous in the northern and some of the inland provinces, is in general fertile, but ill cultivated and thinly inhabited. They have abundance of lemons, oranges, almonds, raisins, and figs; but their most valuable articles for trade are, wines, oils, and silks. The Spanish wool is the finest, and the Spanish iron the best, in Europe.

Spain possesses the extensive territories of Mexico in North America; Terra Firma, Peru, Chili, and Paraguay, in South America; the islands of Cuba, Porto Rico, and part of Hispaniola, in the West Indies; the Canaries on the coast of Africa, and the Philippines in the East Indies.

The commercial attention of the Spaniards has been confined to their American colonies, and their affairs conducted there upon weak and illiberal principles. The quantities of gold and silver which these countries afford, is so great, that their value has diminished more than one half in Europe since their discovery. The gold which passes into Europe is estimated at L.1,000,000, the silver at L.4,000,000, besides a large quantity which passes to the East Indies, or is retained in the country.

The imports to Britain are, fruits, saffron, dye-stuffs, soap, Jesuites bark, barilla, cork, salt, wine, oil, indigo, and cochineal. The exports are, lead, tin, copperas, corn, fish, leather, woollen-cloths, and stuffs, hardware, earthen-ware, clock-work. The imports exceed L.500,000, and the exports are upwards of L.1,000,000.

§ 15. PORTUGAL is situated between 37° and 42° N. The articles of the produce are the same as in Spain. The colonies belonging to this country are, 1st, Brazil, in South America, which sends home gold and diamonds to a very great value, besides tobacco, sugar, hides, ipecacuanha, indigo, cocoa, and Brazil wood, in return for a vast quantity of English, Dutch, French, and German goods exported. 2d, The islands of Madeira, and Cape de Verd,

and the Azores, in the Atlantic; the former of which exports 28,000 pipes wine, chiefly to Britain and the West Indies. 3d, Goa, and one or two more inconsiderable places in the East Indies, the only remains of their former extensive settlements. 4th, Their settlements on the eastern and western coasts of Africa.

The imports to Britain are, wine, fruit, salt, alum, Brazil wood, cork, saffron, soap, white marble, liquorice, and snuff. The exports are, corn, fish, flour, leather, Irish butter, broad-cloth, druggs, and other stuffs, stockings, hats, Birmingham and Sheffield ware, wrought plate, fire-arms. The amount of the imports is L.350,000, and the exports L.675,000.

§ 16. Italy is situated between 38° and 47° N. latitude. Few countries enjoy more advantages of soil, climate, and situation. Venice, built on a number of islands on the Adriatic gulf, carried on the most extensive trade before the southern navigation to India was discovered. It brought the rich produce of the east from the Levant, and distributed it among all the nations in Europe. Genoa, on the opposite coast of Italy, was formerly a rival in commerce to Venice; and the trade of these places, though much decayed, is still considerable, as is that of Leghorn and Naples. Sicily, formerly the granary of the world, still produces corn more than sufficient for its own supply.

The imports to Britain are, raw, thrown, and wrought silk, wine, oil, olives, fruits, anchovies, dyers stuffs, soap, drugs, gums, sulphur, argol; the exports are, iron, tin, lead, great quantities of fish, pepper, pimento, broad-cloths, woollen-stuffs, leather. The extent of the British trade with Italy is about L.800,000. The exports and imports are nearly equal.

§ 17. TURKEY in Europe is situated between 34° and 49° N. latitude. In Asia, the Turks possess most extensive, fertile, and delicious territories; the ancient Asia Minor, Syria, and Arabia; in Africa, Egypt. These countries produce abundance of corn, wine, and oil; of rich fruits, and odoriferous plants and drugs. The Turks have little spirit for trade; their only manufactures are, cottons, carpets, and leather. Their inland trade is carried on by the Jews and Armenians, and the foreign is left to the Europeans, and is mostly in the hands of the English, French, and Dutch. The trade from Britain to Turkey was formerly in the hands of an exclusive company, but is now open to every British subject upon payment of a small fine. The Eastland, Hamburg, Russian, and African companies had formerly like exclusive privileges, which are now abolished in the same manner.

The imports to Britain are, coffee, drugs, gums, dyers stuffs, figs, raisins, box and cypress woods, ebony, raw silk, mohair, wool, skins, leather, and carpets; opium, gall-nuts, and sulphur. The exports are, iron, lead, tin, cochineal, logwood, woollen-cloths, iron.

iron-utensils, hard-ware, clocks, and watches. The imports exceed L.130,000; the exports do not amount to L.80,000.

§ 18. AFRICA is a peninsula of prodigious extent, situated between 37 degrees north and 35 south latitude. The coast of Barbary is possessed of several states, who are addicted to piracy, and leave their foreign trade to the Europeans. Some fruits, and other articles, are imported from those countries, in exchange for fire-arms, and European manufactures. The inland part of Africa is entirely unknown.

The chief intercourse between Europe and Africa is the trade to the coast of Guinea, where are most of the commercial settlements. The British possess Senegal, on the river of the same name; James Fort, on the Gambia; Fort Royal, and some others, on the southern coast. They receive gold-dust, ivory, drugs, gums, and especially slaves, in return for gun-powder, fire-arms, shot, iron, spirits, toys, woollen-cloths, India stuffs, and cowries. The exports from Britain amount to L.600,000; but, as the greater part is exchanged in the slave-trade, and the ships generally proceed with their cargoes to the West Indies, the imports do not exceed L.65,000.

§ 19. ASIA. The discovery of the passage to India by the Cape of Good Hope, in the year 1548, opened a new field of commerce, and introduced or extended the consumption of various articles of luxury in Europe. Rice is the common food, and cotton manufactures the clothing of the country; which articles, together with the spices and drugs peculiar to that climate, form the basis of their commerce. The coast of Malabar supplies pepper, to the extent of 10,000,000 lb. ginger, cassia or bastard cinnamon, sandal-wood, and saffron. The coast of Coromandel furnishes chints, and cotton manufactures of all kinds. Golconda is famous for diamond-mines. Bengal affords opium, to the extent of 12,000,000 lb. rice, sugar, saltpetre, borax, and salt; silks; muslins, and other cotton-manufactures; musk and rhubarb from Thibet. From the eastern continent are brought, gold, ivory, gum-lack, tin of a peculiar kind, sugar, and silks. Syriam, in Pegu, is frequented for building and refitting ships. As to the islands, the chief commodities of the Maldives are, cowries, (small shells, which pass for money in Bengal and Africa), and cocoa-trees; of Borneo, camphire; of Sumatra, pepper and tin; of Java, coffee, pepper, cotton, indigo, betel-nut, and arrack; of Ceylon, betel-leaf and nut, ivory, and pearls, but especially cinnamon, which is peculiar to that island, as is nutmeg and mace to the Banda islands, and cloves to Amboina.

The chief articles imported from China are, tea, silk, and silk-stuffs, porcelain, lacquered ware, and painted paper.

Arabia, produces myrrh, incense, and especially coffee.

Persia supplies silk, Caramanian wool, goats-hair, pearls, dates,
and

and other fruits, in return for Indian goods; and pays a balance in money.

The British have the most considerable settlements on the coast of Indostan. The first British government comprehends the fertile and extensive provinces of Bengal, Bahor, and Orisa. The second government is Madras; the third is Bombay, on the western coast; the fourth is Bencoolen, in Sumatra. The other European settlements have been mentioned already.

The European powers have generally conducted their East India trade by exclusive companies. The British East India Company was incorporated by Queen Elizabeth, in the year 1600, with the exclusive privilege of trading to all countries, from the Cape of Good Hope to the Straights of Magellan. The imports from the countries within the Company's charter to Britain, are, gold, diamonds, drugs, tea, coffee, pepper, ginger, canes, raw silk, porcelain ware, lacquered ware, borax, and saltpetre, for home-consumption; wrought silks, muslins, and cottons, plain and painted, for exportation. The goods exported by the Company are, woollen-manufactures, iron, lead, copper, and military stores, from Britain, and wine from Madeira. The masters and officers of the ships are allowed to export other articles. The amount of the imports is L.1,800,000; and the exports, exclusive of silver, L.500,000. The exportation of silver, in bullion and foreign coin, was formerly considerable; but, of late years, has been very small, except to China. It has been superseded by the large fortunes remitted home from the East Indies by draughts on the Company.

§ 20. AMERICA. The British settlements on North America, previous to the late revolution, extended from 26° to 49° north latitude, stretching upwards of 1200 miles along the Atlantic Ocean. The provinces of Nova Scotia and Canada, the most northerly and least valuable, alone remain subject to Britain. The other have established themselves into an independent republic.

When this country was discovered by the Europeans, it was almost entirely covered with woods; and the back settlements, at a distance from navigable rivers, are still in the same situation. Their commerce is derived from the timber in their woods, and its produce; from the European cattle, which have multiplied greatly in their extensive pastures; and from the commodities suited to the different climates, which the planter raises in the cultivated grounds.

New England exported to Britain, masts, yards, staves, timber, and iron; and to the West Indies, lumber and provisions, viz. beef, pork, butter, cheese, some grain and fish; chiefly in return for molasses, with which they carried on a most extensive distillery. Their trade in shipbuilding for sale was considerable. New York, the Jerseys, and Pennsylvania, supplied the same articles; also copper-ore, wheat, mace, and flax-seed. The staple article of Maryland and Virginia is tobacco. The quantity annually exported amounted

to 96,000 hds. North Carolina supplied the articles produced from the pine, tar, pitch, and turpentine, in greater quantities than any other province. South Carolina furnished rice to the extent of 60,000 barrels for export, and about 200,000 lb. of indigo.

The articles exported from Britain to North America were, woollen cloths and stuffs, linen, silks, Indian manufactures, hats, tools, military stores, hardware, copper, leather, shoes, gloves, saddlery, paper, and almost every kind of manufacture; also tea, spices, china ware, and painters colours. The amount of the exports was about L.2,200,000, and the imports to Britain about half that sum; the residue being paid by goods exported to other nations. From the state of that country, it will probably receive from Europe, for a course of years, a supply of many articles of manufactures; but, on account of its unsettled situation since the revolution, the probable extent of its commercial intercourse with Britain cannot be at present ascertained.

The trade between the American provinces and Indians gives vent to a considerable quantity of coarse woollen stuffs, shirts, and cloaths ready made, fire-arms, powder, shot, hatchets, knives, kettles, tobacco, and rum. The returns are, beavers, and all kinds of furs and skins.

We next proceed to the North American colonies which continue in allegiance to Britain. The most considerable is Canada, conquered from the French in the war of 1756, which supplies great quantities of furs, obtained by the Indian trade; also lumber, and some provisions for the West Indies. Nova Scotia, a cold and barren country, between 43 and 49 degrees north latitude, is chiefly valuable for the excellent harbour of Halifax. It carries on a considerable cod-fishery, and supplies some timber for ship-building. Newfoundland, and the adjoining banks, are remarkable for the most plentiful cod-fishery in the world. The cold and inhospitable climate of Hudson's Bay, has not discouraged the British from effectuating a settlement, where a trade is carried on with the Esquimaux, or natives, in the articles formerly mentioned. It is in the hands of an exclusive company. The Floridas, though situated in a favourable latitude, have not hitherto produced any valuable articles for commerce.

§ 21. The WEST INDIAN ISLANDS being situated in the Torrid Zone, never experience the rigour of winter; and their only distinction of seasons is that of dry or rainy. The latter sets in about the beginning of June, and continues four or five months. They are exposed to the most violent and destructive hurricanes, which generally happen in August. These islands afford the choicest fruits, the tallest and hardest wood, and are capable of raising almost any produce; but the attention of the planters is entirely confined to the valuable articles particularly suited to the climate, and constantly demanded for the European market. Hence they de-

depend on foreign supply for every article of manufacture; and for the greater part of their subsistence.

The sugar-cane is the capital article which employs their industry; and its produce, sugar, rum, and molasses, are the chief articles of their export. The quantity of sugar produced in the British West Indies is estimated at upwards of 200,000 hds. The other articles of produce are, cotton, coffee, cocoa, tobacco, mahogany, red-wood, fustic, sweet-meats, ginger, and pimento.

They receive from Britain manufactures and utensils of every kind, lime, bricks, beer, French wines, and East Indian commodities; from Ireland, linen, beef, pork, and other provisions; from Madeira, wine; from Africa, gold dust, and slaves; from Newfoundland, cod fish; from the continent of America, lumber, staves, and provisions; from the Spanish settlements, gold, silver, quicksilver, cochineal, indigo, lignum-vitæ, Jesuits-bark, and other drugs, and tortoise-shell. The greater part of these are transmitted, along with their own produce, to Britain.

§ 22. The whole value of goods imported annually into Britain amounts to L.11,833,000, and the value of exports to L.14,950,000. These sums, as well as the former ones, are taken from the custom-house books, being the average of 10 years from 1764 to 1773, a time of peace abroad and tranquillity at home, and therefore proper for ascertaining the extent of our trade, when not excited or retarded by occasional circumstances. In the ten last years of the former century, the imports amounted only to L.4,500,000, the exports to L.6,000,000. Thus, it appears, that there is a balance of more than L.3,000,000 on the side of exportation. We must notice, however, that the imports are stated too low in the custom-house books, and the exports are too high. The rates at which goods imported are charged is generally below the real value, and the quantity clandestinely imported is considerable. On the other hand, as goods exported are generally duty free, no strict account is taken of their quantity or value; and merchants often make their entries too high, in order to affect importance in the extent of their trade: And clandestine exportation can only take place in the few articles subject to duty or prohibited; which being rude produce, are, comparatively, of small value. Allowance being made for these circumstances, it is probable that the value of imports and exports is nearly equal. The balance, on whichever side it lies, must be ultimately paid in money, and increase or diminish the quantity of gold and silver in the kingdom. As the riches or poverty of the nation is supposed by many to consist in the quantity of these metals, it is proper to mention the concurring circumstances on which that quantity depends.

As Britain has no mines of gold and silver, and the quantity of silver extracted from lead-ore is inconsiderable, we have no internal source of supply. The wear of the current coin and plate, by time

and accidents; the money spent by British subjects on their travels abroad, which is greater than the expence of foreigners here; the part of the interest on the national debt paid to foreigners; the expence of foreign garrisons and establishments; are the constant causes which drain our specie; to which there is added, in time of war, the whole expence of our armies and navy abroad, and subsidies paid to foreign princes. On the other hand, we may state the whole profits of foreign trade; the freight of British shipping employed in it, so far as it is not exhausted by their expences abroad. These, estimated at 10 per cent. which, on an average, is too low, will exceed a million, exclusive of the carrying trade. To this must be added the produce of the Newfoundland and other fisheries, which goes directly abroad, and therefore does not appear in the custom-house books, though the value centers in Britain. Another considerable accession of wealth is that of fortunes made abroad, especially in the East and West Indies, and brought home by the owners to Britain. There is little of this kind to throw into the opposite scale, as few foreigners retire to other countries with fortunes acquired in Britain. Lastly, we may notice, that, when a new loan is made, the part advanced by foreigners increases our circulating money in the first instance, though it tends to impoverish us in the issue.

C H A P II.

CUSTOM-HOUSE LAWS.

§ 23. **T**HE expedient of exacting duties on goods imported or exported, has been adopted by every commercial nation in Europe. The attention of the British legislature has not been confined to the object of raising a revenue alone, but they have attempted, by duties, exemptions, drawbacks, bounties, and other regulations, to direct the national trade into those channels which are supposed to contribute most to the public benefit. And, in order to obtain every requisite information, all goods, exported or imported, whether liable to duty or not, are required to be entered at the respective custom houses; and, from these entries, accompts are regularly made up of the whole British trade, distinguishing the articles, their quantity and value, and the countries which supply or receive them.

The objects of the British legislature may be reduced to the following heads:

First, To encourage the employment of British shipping and seamen, for the purpose of supplying our navy, when public exigencies require.

Secondly, To increase the quantity of money in the nation, by prohibiting the exportation of British coin, by encouraging exportation, and discouraging importation, and by promoting agriculture, fish-

fisheries, and manufactures. For these purposes, it is penal to entice certain manufacturers abroad, or export the tools used in their manufactures; the exportation of raw materials is, in most instances, prohibited; and their importation permitted free from duty, and sometimes rewarded with a bounty. The exportation of some goods, manufactured to a certain length only (for example white cloth), is loaded with a duty, but permitted duty free when the manufacture is carried to its full extent. The importation of rival manufactures is loaded with heavy duties, or absolutely prohibited. These restrictions are most severe towards nations with which the balance of trade is supposed against us, or which are considered as our most formidable rivals in power or commerce. Upon this principle, the commerce with France, till lately, laboured under the heaviest restrictions.

Thirdly, To secure us plenty of necessaries for subsistence and manufacture, by discouraging the exportation of some articles that consume by length of time, and regulating the corn-trade according to the exigencies of the seasons.

Fourthly, To secure the trade of the colonies to the mother-country, and preserve a mutual intercourse, by encouraging the produce of their staple-commodities, and restraining their progress in those manufactures which they receive from us in exchange.

§ 24. The foundation of our commercial regulations is the famous act of navigation, which was first enacted during the time of the commonwealth, and adopted by the first parliament after the restoration. The substance of this act, and subsequent amendments, is as follows.

Goods from Asia, Africa, and America, may not be imported, except in British ships duly navigated, or ships belonging to the British plantations; and they can only be imported from the place of their production or manufacture, or the port where they are usually first shipped for transportation. Goods of the Spanish or Portuguese plantations, imported from Spain and Portugal in British ships, bullion and some other inconsiderable articles are excepted.

The restriction on European goods is not universal, but extends to several of the bulkiest articles. Russian goods, masts, timber, boards, salt, pitch, rosin, tar, hemp, flax, raisins, figs, prunes, olives, oil, corn, sugar, potashes, wine, and vinegar, may not be imported, except in ships belonging to Great Britain or Ireland, legally manned; nor Turkey goods and currants, except in ships British built; or in ships belonging to the country where these goods are produced or manufactured, or first shipped for exportation; and, if imported in foreign ships, they pay alien's duty.

In order to intitle a ship to the privileges of a British ship, it must be built in Britain, and belong entirely to British subjects; and the master, and three-fourths of the mariners, must be British subjects,

jects, except in case of death, or unavoidable accidents. In time of war, the proportion of British mariners required is generally confined to one-fourth; and the same proportion only is required in the Greenland fishery.

No goods may be imported into, or exported from the plantations in Asia, Africa, or America, except in ships built in Britain, Ireland, or the plantations, or prize ships, manned by British subjects, duly registered, and legally navigated.

The following goods, *enumerated* in the act of navigation, and subsequent acts, may not be exported from the plantations, except to some other plantation or to Britain: Tobacco, cotton-wool, indigo, ginger, fustic, and other dying wood, molasses, hemp, copper-ore, beaver-skins and other furs, pitch, tar, turpentine, masts, yards, and bolspirts, coffee, pymento, cocoa-nuts, whale-fins, raw-silk, pot and pearl ashes. Rice and sugar were formerly comprehended in this list, but their exportation is now permitted under certain restrictions.

Iron may not be imported to Europe, except to Ireland; and none of the non-enumerated may be imported to any country north of Cape Finisterre, except the Bay of Biscay, and Ireland.

§ 25. For the more effectual prevention of smuggling, no goods may be imported in vessels belonging to British subjects, and no wine, in any vessel whatever, unless the master have a manifest on board, containing the name, measure, and built, of the ship, the place to which it belongs, and a distinct enumeration of the goods on board, and places where they were laden. If the ship be cleared from any place under his Majesty's dominions, the manifest must be attested by the chief officer of the customs, or chief magistrate, who is required to transmit a copy thereof to the place of destination. Ship-masters must deliver copies of this manifest to the first custom-house officer who goes on board within four leagues of the shore, and also to the first who goes on board within the limits of any port, and must deliver the original manifest to the custom-house at their arrival, and make report of their cargo upon oath. If the report disagree with the manifest, or either disagree with the cargo on board, the ship-master is liable in the penalty of L.200. The proprietors of the goods must enter them, and pay the duties, within 20 days; otherwise they may be carried to the custom-house, and sold by auction, if not relieved within six months; and the overplus of the value, after paying duty and charges, paid to the proprietors.

§ 26. The importation of cattle, beef, mutton, and pork, except from Ireland, woollen-cloths, malt, and various articles of hardware, cutlery, and earthen-ware is prohibited: Also the following goods from Germany and the Netherlands; olive oil, pitch, tar,
pot-

potashes, rosin, salt, tobacco, wines, except Rhenish wine, and Hungary wines from Hamburgh.

§ 27. The importation of various other goods is restricted by particular regulations respecting the time and place of importation, the packages, the burden of the ship, the requisition of a licence, and other circumstances.

To guard more effectually against clandestine trade, the importation of some articles is only permitted in ships of a certain burden, whose operations are not easily concealed. Spirits must be imported in ships of 100 tons, or upwards, except rum, and spirits of British plantations, which are only restricted to 70 tons; wine, 60 tons; tea, tobacco, and snuff, 50 tons; salt, 40 tons. Wine, spirits, and tobacco are also restricted in respect of the packages in which they may be imported.

§ 28. Diamonds and precious stones, flax, flax-seed, linen-rags, beaver-wool, wool for clothiers, linen-yarn unbleached, and most drugs used in dying, may be imported duty free.

§ 29. All goods imported are liable to duties, except such as are expressly exempted. The revenue of customs is of great antiquity in Britain, but was new modelled at the restoration of Charles II. A subsidy of tonnage on wines, and of poundage, or one shilling per pound value of other goods, was granted during the King's life, and, after several prolongations, rendered perpetual. A book of rates was composed for ascertaining these values; and articles not rated paid duty according to the value, as affirmed, upon oath, by the importer. If the goods be valued too low by the importer, the custom-house officer may seize them, upon paying to the proprietor the value he swore to, and 10 per cent. for profit; such goods to be sold, and the overplus paid into the customs. Various additional duties have been imposed; some on all goods, some on particular kinds; some according to the rates, some unconnected with the rates; some with an allowance of certain abatements, some without any allowance; the greater part to be paid down in ready money, and a few for which security may be granted; often with variations, according to the ship's place, and circumstances of importation. The number of branches amounted to upwards of 50; and sometimes more than 10 were chargeable on the same articles. By this means, the revenue of the customs has become a subject of much intricacy. The inconveniences which this gave rise to are now removed by the consolidation act; which appoints one fixed duty for each article free from fractions, instead of the various branches to which they were formerly subject.

§ 30. Goods of most kinds may be exported duty free when regularly entered; and those that have paid duty on importation are generally intitled to drawback of part, sometimes of the whole, when

when re-exported within three years, upon certificate that the duties were paid on importation, and oath of their identity. In some cases, a bounty is given on manufactured goods, when the materials from which they are manufactured have paid duty on importation; and manufactures subject to excise, have generally the whole or part of the excise duties returned.

§ 31. The following goods are prohibited to be exported; white-ashes, horns, unwrought hides of black-cattle, tallow, coin, brads, copper, engines for knitting stockings, tools for cotton, linen, woollen, silk, iron and steel manufactures; wool, woollfells, woollen yarn, fullers earth, fulling clay, and tobaccco pipe-clay.

§ 32. The object of the laws respecting the corn-trade is to encourage agriculture, by not only permitting the free exportation, but rewarding it with a bounty when the prices are low, and checking the importation by a heavy duty; and, to prevent scarcity, by prohibiting the exportation when the prices are high, and permitting importation at an easy duty. Various temporary laws have been enacted for these purposes, and sometimes other expedients employed in times of scarcity, such as prohibiting the distillery from corn, and manufacture of starch: And by a permanent law 1773, the low duties and bounties are regulated as under:

	Low Duty.		Bounty.	
Wheat at or above	48s. per q.	6d.	under 44s.	5s.
Rye	32s.	3d.	28s.	3s.
Pease and beans	32s.	3d.	28s.	no bounty.
Oats	16s.	2d.	14s.	2s.
Barley	24s.	2d.	22s.	2s. 6d.

The duties, when the prices are lower than in the first column, amount to a prohibition. When the prices are higher than in the column prefixed to the bounty, no exportation is permitted. When oats are under the bounty price, oatmeal is intitled to a bounty of 2s. 6d. per quarter.

§ 33. Bounties are allowed on the exportation of refined sugar, sail-cloth, linen under limited prices, silk stuffs of British manufacture, cordage, spirits, when barley is under 24s. beef, pork, and the following kinds of fish, salmon, herrings, pilchards, cod, ling, flake, and sprats.

Various other bounties are allowed for the encouragement of our fisheries. Ships from 150 to 300 tons employed in the Greenland whale-fishery, and conforming to the regulations prescribed, are allowed 30s. per ton. Vessels employed in the herring-fishery receive 20s. per ton, besides a bounty on the herrings caught and cured, amounting in some cases to 4s. per barrel. Other bounties are granted to a limited number of the most successful vessels employed in the

the herring and Newfoundland fisheries, and in the southern whale fishery.

It is unnecessary and impracticable in this place, to enter into a full detail of our custom-house laws *. The foregoing particulars will enable the student to judge of the principles upon which the British legislature has acted. How far the means employed have contributed to the ends proposed, and how far the ends themselves are always wise; or whether a trade incumbered by fewer restrictions, would not prove more extensive and beneficial, has been a subject of much discussion: and of late, a more liberal system has been embraced, in our commercial treaty with France, and other regulations.

C H A P. III.

MERCANTILE LAWS.

§ 34. **T**HE laws relating to commercial and maritime affairs approach nearer to uniformity, through the different countries of Europe, than those on other subjects. Some of the fundamental regulations have been taken from the Roman law; others have been suggested by experience, during the progress of commerce; and the whole have been gradually reduced to a system, and adopted into the laws of trading nations, but with some local varieties and exceptions.

The British legislature has enacted many statutes respecting commerce; yet the greater part of our mercantile law is to be collected from the decisions of our courts of justice, founded on the custom of merchants. A proof of such custom, where no direct statute interferes, determines the contraversion, and becomes a precedent for regulating like cases afterwards. The existence of a custom not formerly recognized, is, in England, determined by a jury of merchants.

The most common mercantile contracts are those between buyer and seller; between factor and employer; between partners; between the owners, masters, mariners, and freighters of ships; between insurers and the owners of the subject insured; and between the parties concerned in transacting bills of exchange.

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S E C T.

* In the former edition, an abstract of the custom-house laws, rather fuller than above, was inserted: But all that can be admitted into a book of this kind must convey but very imperfect information; and even that little becomes useless in a short time from alterations in the law. This happened within a year after the publication of the last edition. We have therefore only marked the general outlines in the present one.

SECT. I. SALE.

§ 35. SALE is the exchange of a commodity for money; barter, or permutation, is the exchange of one commodity for another. When the bargain is concluded, an obligation is contracted by the buyer to pay the value, and by the seller to deliver the commodity, at the time and place agreed on, or immediately, if no time be specified.

In this, as well as other mercantile contracts, the safety of commerce requires the utmost good faith and veracity. Therefore, altho' by the laws of England, a sale, above the value of L.10, be not binding, unless earnest be paid, or the bargain confirmed by writing, a merchant would lose all credit who resiled from his agreement, although these legal requisites were omitted.

When a specific thing is sold, the property, even before delivery, is, in some respect, vested in the buyer; and, if the thing perishes, the buyer must bear the loss. For example, if a horse dies before delivery, he must pay the value: But, if the bargain only determines the quantity and quality of the goods, without specifying the identical articles, and the seller's ware-house, with all his goods, be burned, he is intitled to no payment. He must also bear the loss, if the thing perish through his fault; or when a particular time and place of delivery is agreed on, if it perish before it be tendered, in terms of the bargain.

If a person purchase goods at a shop, without agreeing for the price, he is liable for the ordinary market-price at the time of purchase.

If the buyer prove insolvent before delivery, the seller is not bound to deliver the goods without payment or security.

If the importation, or use of the commodities sold, be prohibited by law, or, if the buyer knows that they were smuggled, no action lies for delivery.

The property of goods is generally presumed, in favour of commerce, to belong to the possessor, and cannot be challenged in the hands of an onerous purchaser. But to this there are some exceptions. By the Scots law, stolen goods may, in all cases, be reclaimed by the proprietor, and also by the English law, unless they were bought *bona fide*, in open market, or in a public shop in London. In all cases, if the goods be evicted by the lawful proprietor, the seller is liable to the purchaser for the value.

Actions for payment of shop-accompts as well as other debts not constituted by writing, are limited in England to six years. The testimony of one witness is admitted; and the seller's books, although the person that kept them be dead, are good evidence for one year. In Scotland, merchants accompts may be proved, within three years of the date of the last article, by one witness, and the creditor's books and oath in supplement. After three years, they can only

only be proved by the oath or writ of the debtor. A merchant's books are, in all cases, good evidence against him.

SECT. II. FACTORAGE.

§ 36. A factor is an agent employed by merchants residing at other places to buy or sell goods, or negotiate bills, or transact any kind of business on their account; and intitled to a certain allowance for his trouble.

A supercargo differs from a factor in this: The business of the former is limited to the care of a particular cargo; he goes along with it, and generally returns when his business is completed; the latter has a fixed residence abroad, and executes business for different merchants: But their duties, and the circumstances for which they are accountable, are the same.

The duty of a factor is to procure the best intelligence of the state of trade at his place of residence; of the course of exchange; of the quantity and quality of goods at market, their present price, and the probability that it may rise or fall; to pay exact obedience to the orders of his employers; to consult their advantage in matters referred to his discretion; to execute their business with all the dispatch that circumstances admit; to be early in his intelligence, distinct in his accounts, and punctual in his correspondence.

A factor's power is either absolute or limited. Though intrusted with ample discretionary powers, he is not warranted to take unreasonable or unusual measures, or do any thing contrary to his employer's interest; but it is incumbent on the employer, if he challenge his proceedings, to prove that he could have done better, and was guilty of wilful mismanagement.

When a factor's power is limited, he must adhere strictly to his orders. If he exceed his power, though with a view to his employer's interest, he is liable for the consequence. For example, if he gives credit when not impowered, or longer credit than impowered, for the sake of a better price, and the buyer proves insolvent, he is liable for the debt. A factor has no power to give credit, unless authorised: But, if the goods consigned be generally sold on credit at the place of consignment, the factor will be vindicated for selling at the usual credit, unless expressly restricted.

Although opinion will never justify the factor for departing from orders, necessity sometimes will. If he be limited not to sell goods under a certain price, and the goods be perishable, and not in a situation for being kept, he may sell them, to prevent their destruction, even under the price limited.

A factor is never warranted to deal on trust, except with persons in good credit at the time. If the employer challenge the debtors, it is incumbent on him to prove that their bad circumstances was

known at the time of sale; and the factor will be vindicated, if he trusted them at the same time for goods of his own.

If the factor sell his employer's goods on trust, and, after the day of payment is elapsed, receive payment from the purchaser for a debt of his own, he becomes liable in equity for the debt.

In case of bankruptcy, the factor ought immediately to lay attachments, and advise his employers; and he cannot withdraw his attachments, nor compound debts, without orders.

If a factor sell goods belonging to different merchants to the same person, and the buyer proves insolvent, they shall bear the loss in equal proportions; and if the buyer has paid part before his insolvency, without specifying for which, the payment ought to be distributed in equal proportions; but, if the days of payment be fixed, and part of the debts only due, the payment ought to be applied, in the first place, to such debts as were due.

If he make a wrong entry at the custom-house, and the goods be seized in consequence thereof, he must bear the loss, unless the error be occasioned by a mistake in the invoice, or letter of advice.

The owner bears the loss of goods seized when attempted to be smuggled by his orders; but the factor complying with an unlawful order, is liable in such penalties as the law exacts.

If a factor save the duty of goods due to a foreign prince, he shall have the benefit; for, if detected, he bears the loss.

If a factor sell goods bought by his employer's orders for his own advantage, the employer may recover the benefit, and the factor shall be amerced for the same.

If a factor receive bad money in payment, he bears the loss; but, if the value of the money be lessened by the government, the employer bears the loss.

A factor is not liable for goods spoiled, robbed, or destroyed by fire.

If a factor be ordered to make insurance, and neglect it, and the subject be lost, he is liable to make it good, providing he had effects in his hands.

If a factor buy goods for his employer, his bargain shall be binding on the employer.

In case of a factor's insolvency, the owner may reclaim his goods; and, if they be sold on trust, the owner (and not the factor's creditors) shall recover payment of the debts.

SECT. III. PARTNERSHIP.

§ 37. PARTNERSHIP is a contract among two or more persons, to carry on a certain business, at their joint expence, and share the gain or loss which arises from it. Of this there are four kinds.

I. Occasional joint trade, where two or more merchants agree to employ a certain sum in trade, and divide the gain or loss so soon

as the adventure is brought to an issue. This kind of contract being generally private, the parties concerned are not liable for each other. If one of them purchase goods on trust, the furnisher, who grants the credit through confidence in him alone, has no recourse, in case of his insolvency, against the other partners. They are only answerable for the share of the adventure that belongs to the insolvent partner.

If it be proposed to carry the adventure further than originally agreed on, any partner may withdraw his interest; and, if it cannot be separated from the others, may insist that the whole shall be brought to an issue.

§ 38. II. Standing companies, which are generally established by written contract between the parties, where the stock, the firm, (See Part III. § 4. 1sth,) duration, the division of the gain or loss, and other circumstances, are inserted.

The powers of each partner are, in general, discretionary; but they ought not to act, in matters of importance, without consulting together, when there is an opportunity. No partner is liable to make good the loss arising from his judging wrong in a case where he had authority to act. If he exceed his power, and the event prove unsuccessful, he must bear the loss; but, if it prove successful, the gain belongs to the company: Yet if he acquaint the company immediately of what he has done, they must either acquiesce therein, or leave him the chance of gain, as well as the risk of loss.

All debts contracted under the firm of the company are binding on the whole partners, though the money was borrowed by one of them, for his private use, without the consent of the rest. And, if a partner exceeds his power, the others are nevertheless obliged to implement his engagements; though he is responsible to them for his misbehaviour.

A debt to a company is not cancelled by the private debts of the partners; and, when a partner becomes insolvent, the company is not bound for his debts beyond the extent of his share.

The debts of the company are preferable, on the company's effects, to the private debts of the partners.

Partnership is generally dissolved by the death of a partner; yet, when there are more partners than two, it may, by agreement, subsist among the survivors. Sometimes it is stipulated that, in case of the death of a partner, his place shall be supplied by his son, or some other person condescended on. The contract ought to specify the time and manner in which the surviving partners shall reckon with the executors of the deceased, for his share of the stock, and a reasonable time allowed should be for that purpose.

When partnership is dissolved, there are often outstanding debts that cannot be recovered for a long time, and effects that cannot easily be disposed on. The partnership, though dissolved in other respects, still subsists, for the management of their outstanding affairs,

fairs, and the money arising from them is divided among the partners, or their representatives, when it is recovered. But as this may protract the final settlement of the company's affairs to a very inconvenient length, other methods are sometimes used to bring them to a conclusion, either in consequence of the original contract, or by agreement at the time of dissolution. Sometimes the debts and effects are sold by auction; sometimes they are divided among the partners; and, when there are two partners, one divides them into shares, as equal as possible, and the other chooses either share he thinks best.

If a partner withdraws, he continues responsible for debts contracted by the company till it be publicly known that he hath done so. A deed of separation, registered at a public office, is sufficient presumption of such notoriety.

§ 39. III. Companies, where the business is conducted by officers. There are many companies of this kind in Britain, chiefly established for purposes which require a larger capital than private merchants can command. The laws with respect to these companies are the same as the former, but the articles of their agreement usually very different. The capital is specified, and divided into a certain number of shares, whereof each partner may hold one or more, but is generally restricted to a certain number. Any partner may transfer his share; and the company must admit his assignee as a partner. The death of the partners has no effect on the company. No partner can act personally in the affairs of the company; but the execution of their business is intrusted to officers, for whom they are responsible; and, when the partners are numerous, the superintendency of the officers is committed to directors chosen annually, or at other appointed times, by the partners.

§ 40. IV. Companies incorporated by authority. A royal charter is necessary to enable a company to hold lands, to have a common seal, and enjoy the other privileges of a corporation. A charter is sometimes procured, in order to limit the risk of the partners; for, in every private company, the partners are liable for the debts, without limitation; in incorporated societies, they are only liable for their shares in the stock of the society. The incorporation of societies is sometimes authorised by act of parliament; but this high authority is not necessary, unless for conferring exclusive privileges.

SECT. IV. MARITIME LAWS.

§ 41. THE most ancient system of maritime laws is that of Rhodes, which was in force during the time of the Grecian empire, and afterwards incorporated into the Roman law. Although, in some parts, not applicable to the present state of trade, and, in others, now hardly intelligible, it contains the ground-work of the most

equitable and beneficial rules observed in modern commerce. A like system was set forth by Richard I. of England, called the Statutes of Oleron; and another, by the town of Wisby, in the island of Gothland. From these systems, improved and enlarged in the course of time, our general maritime law is derived. The jurisdiction of matters purely maritime belongs, in England, to the court of admiralty, which proceeds on the civil law; but their proceedings are subject to the controul, and their decisions to the review, of the superior courts.

§ 42. A CHARTER-PARTY is a contract between the master and freighters; in which the ship and voyage is described, and the time and conditions of performing it ascertained.

The freight is most frequently determined for the whole voyage, without respect to time. Sometimes it depends on the time.

In the former case, it is either fixed at a certain sum, for the whole cargo; or so much per ton, barrel-bulk, or other weight or measure; or so much per cent. on the value of the cargo.

The burden of the ship is generally mentioned in the contract, in this manner, *One hundred tons, or thereby*; and the number mentioned ought not to differ above 5 tons at most from the exact measure. If a certain sum be agreed on for the freight of the ship, it must all be paid, although the ship, when measured, should prove less, unless the burden be *warranted*. If the ship be freighted for *transporting* cattle, or slaves, at so much a head, and some of them die on the passage, freight is only due for such as are delivered alive; but, if for *lading* them, it is due for all that were put on board.

When a whole ship is freighted, if the master suffer any other goods, besides those of the freighter, to be put on board, he is liable for damages.

It is common to mention the number of days that the ship shall continue at each port, to load or unload. The expression used is *work weather days*, to signify that Sundays, holidays, and days when the weather stops the work, are not reckoned. If the ship be detained longer, a daily allowance is often agreed on, in name of demurrage.

If the voyage be completed in terms of the agreement, without any misfortune, the master has a right to demand payment of the freight before he delivers the goods. But, if the safe delivery be prevented by any fault or accident, the parties are liable, according to the following rules:

If the merchant do not load the ship within the time agreed on, the master may engage with another, and recover damages.

If the merchant loads the ship, and recalls it, after it has set sail, he must pay the whole freight; but if he unloads it before it sets sail, he is liable for damages only.

If a merchant loads goods which it is not lawful to export, and the

the ship be prevented from proceeding on that account, he must pay the freight notwithstanding.

If the shipmaster be not ready to proceed on the voyage at the time agreed on, the merchant may load the whole, or part of the cargo, on board another ship, and recover damages; but notorious accident, by the maritime law, releases the master from damages.

If an embargo be laid on the ship before it sails, the charter-party is dissolved, and the merchant pays the expence of loading and unloading; but, if the embargo be only for a short limited time, the voyage shall be performed when it expires, and neither party is liable for damages.

If the shipmaster fails to any other port than that agreed on, without necessity, he is liable for damages. If through necessity, he must fail to the port agreed on, at his own expence.

If a ship be taken by the enemy, and re-taken or ransomed, the charter-party continues in force.

If the master transfer the goods from his own ship to another without necessity, and they perish, he is liable for the value; but, if his own ship be in imminent danger, the goods may be put on board another ship, at the risk of the owner.

If a ship be freighted out and home, and a sum agreed on for the whole voyage, nothing is due till it return; and the whole is lost, if the ship be lost on the return.

If a certain sum be specified for the homeward voyage, it is due, although the factor abroad should have no goods to send home.

In the case of a ship freighted to Madeira, Carolina, and home, a particular freight fixed for the homeward voyage, and an option reserved for the factor at Carolina to decline it, unless the ship arrived before 1st March; the shipmaster, foreseeing he could not arrive there within that time, and might be disappointed of a freight, did not go there at all. He was found liable in damages, as the obligation was absolute on his part, and conditional only on the other.

If the goods be damaged without fault of the ship or master, the owner is not obliged to receive them and pay freight, but he must either receive the whole, or abandon the whole; he cannot choose those that are in best order, and reject the others. If the goods be damaged through the insufficiency of the ship, the master is liable for the same; but, if it be owing to stress of weather, he is not accountable. It is customary for shipmasters, when they suspect damage, to take a *protest against wind and weather* at their arrival. But, as this is the declaration of a party, it does not bear credit, unless supported by collateral circumstances.

If part of the goods be thrown over board, or taken by the enemy, the part delivered pays freight.

The shipmaster is accountable for all the goods received on board,
by

by himself, or mariners, unless they perish by the act of God, or of the King's enemies.

Shipmasters are not liable for leakage on liquors, nor accountable for the contents of packages, unless packed and delivered in their presence.

Upon a principle of equity, that the labourer is worthy of his hire, differences arising with regard to freight, when the case is doubtful, ought rather to be determined in favour of the shipmaster.

§ 43. When debts are contracted for provisions or repairs to a ship, or arise from a failure in any of the above-mentioned obligations, the ship and tackle, and the owners, are liable for the debt, as well as the master.

By the mercantile law, the owners are liable, in all cases, without limitation; but, by statute, they are not liable for embezzlement beyond their value of ship, tackle, and freight.

A shipmaster may pledge his ship for necessary repairs during a voyage; and this hypothecation is implied by the maritime law, when such debts are contracted. This regulation is necessary, and is therefore adopted by all commercial nations; for, otherwise, the master might not find credit for necessary repairs, and the ship might be lost. If repairs be made at different places, the last are preferable.

The relief against the ship is competent to the court of admiralty in England only when repairs are furnished during the course of a voyage; for the necessity of the case extends no further. If a ship be repaired at home, (*e. g.* upon the river Thames), the creditor is only intitled to relief at common law.

The creditor may sue either the master or owners; but if he undertook the work on the special promise of the one, the other is not liable.

If the master buy provisions on credit, the owners are liable for the debt, though they have given him money to pay them.

If a ship be mortgaged, and afterwards lost at sea, the owners must pay the debt; for the mortgage is only an additional security, though there be no express words to that purpose in the covenant.

If a ship be taken by the enemy, and ransomed, the owners are liable to pay the ransom, though the ransomer die in the hands of the captors.

§ 44. There is a mutual obligation which subsists between all the owners of a ship and cargo. In time of danger, it is often necessary to incur a certain loss of part for the greater security of the rest; to cut a cable; to lighten the ship, by throwing part of the goods over board; to run it ashore; or the like: And, as it is unreasonable that the owners of the thing exposed for the common

safety should bear the whole loss, it is defrayed by an equal contribution among the proprietors of the ship, cargo, and freight. This is the famous *Lex Rhodia de jactu*, and is now called a GENERAL AVERAGE.

The custom of valuing goods, which contribute to a general average, is not uniform in all places. They are generally valued at the price they yield at the port of destination, charges deducted; and goods thrown over board are valued at the price they would have yielded there. Sailors wages, clothes, and money belonging to passengers, and goods belonging to the King, pay no general average; but proprietors of gold and silver, in case of goods being thrown over board, contribute to the full extent of their interest.

The following particulars are charged as general average; damage sustained in an engagement with the enemy; attendance on the wounded, and rewards given for service in time of danger, or gratuities to the widows or children of the slain; ransom; goods given to the enemy in the nature of ransom; charges of bringing the ship to a place of safety, when in danger from the enemy, or waiting for convoy; charges of quarantine; goods thrown over board; masts or rigging cut; holes cut in the ship to clear it of water; pilotage, when a lake is sprung; damage, when voluntarily run a-ground, and expence of bringing it afloat; goods lost by being put in a lighter; the long boat lost in lightening the ship in time of danger; hire of cables and anchors; charges of laying in ballast, victualling, and guarding the ship when detained; charges at law in reclaiming the ship and cargo; interest and commission on all these disbursements.

Though goods put on board a lighter, and lost, are charged as a general average; yet if the lighter be saved, and the ship, with the rest of the goods, be lost, the goods in the lighter belong to their respective proprietors, without being liable to any contribution.

If part of the goods be plundered by a pirate, the proprietor or shipmaster is not intitled to any contribution.

The essential circumstances that constitute a general average are these: The loss must be the effect of a voluntary action; and the object of that action the common safety of the whole. Quarantine, which is allowed, seems not to fall within this description.

§ 45. WRECKS of ships and goods cast ashore, were seized, in former times, by the states on whose coast the misfortune happened. This custom, which is altogether unjustifiable, except in cases where the owner cannot be discovered, is now greatly mitigated, if not entirely laid aside.

In England, if any living creature, man, dog, or cat, escape alive from the ship, it is not esteemed a wreck; and the property remains to the owners.

In Scotland, although no living creature be saved, if the property be proven, and if it belongs to a nation which deals with us on the same equitable terms, it is restored to the owners, and they are allowed a year and day to prove it.

Wrecked goods, which are not cast ashore, are distinguished by the name of *jetsam*, *flotsam*, and *lagan*. *Jetsam*, when the goods are thrown over board, and sink under the water; *flotsam*, when they remain swimming; *lagan*, when tied to a buoy, in order to be found again. These belong to the former owner; and to the King, when no owner appears to claim them.

SECT. V. INSURANCE.

§ 46. Insurance is a contract, whereby one party engages to pay the losses which the other may sustain, for a stipulated premium or consideration. The most common sorts are, insurance against the dangers of the seas, insurance against fire, insurance of debts, and insurance of lives.

Insurance against loss at sea is a most beneficial institution for promoting the security of trade, and preventing the ruin of individuals; and is now conducted by a regular system of rules, established by the interposition of the legislature, the decision of the courts of justice, and the practice of merchants.

The parties who engage to pay the damage are called the Insurers or Underwriters; the parties for whose security they engage are called the Insured. The premium is understood to be paid when the insurance is made; but if it be not paid, the insurers have a preferable right on the subject insured.

On this subject, we shall consider what is necessary to render an insurance valid—When the risk commences, and when it terminates—What constitutes a total or a partial loss—What proof of loss is necessary—and how the loss is adjusted.

§ 47. I. In order to render an insurance valid, the insured must have property really at stake; the voyage must take place under the circumstances agreed on; the dangers insured against must not be contrary to law; and a candid account must be given of circumstances which enhance the danger.

The condition of possessing property was required, by 19th Geo. II. cap. 37. to prevent ships from being fraudulently destroyed when insured above their value; and to discourage a practice which had become common, of converting policies to the purpose of mere wagers. In transactions of this kind, as the insured had no property, and could claim no indemnification for partial damage, so the insurers, having lost their wager by the ship's being lost, could claim no abatement, though part was saved; accordingly, the policies contained clauses of interest or no interest, free from average,

rage, and without benefit of salvage. All such policies are declared invalid.

This restriction does not extend to privateers, nor to ships trading to the Spanish or Portuguese plantations.

Insurances are commonly made as interests shall appear; and it is incumbent on the insured to prove the value of his property. The value of the goods may be proved by the invoices; and the cocquet must be produced, if required, to instruct that the goods were actually shipped. It is admitted to value the ship at prime cost and charges, deducting the freights that have been drawn since purchased, if the proprietors choose to stand to that rule; but they are not restricted to it. Sometimes the value of the ship or goods is expressed in the policy, and this value must be admitted, altho' it be higher than the true one; but it is incumbent on the insured to prove that he had property at stake; and if the property be trifling in comparison of the sum insured, the insurance will be set aside, as an evasion of the statute.

Expected profits, and bounty on the whale-fishery, if specified in the policy, may be insured.

When the value is less than the sum insured, the owners may claim a return of premium for the excess.

If there be several policies on the same subject, of different dates, the earlier one is valid, and the others must be vacated. If they be of the same date, they must be vacated in equal proportions.

When a policy is vacated, in whole, or in part, the underwriters have a right to retain $\frac{1}{2}$ per cent. for their trouble.

Re-insurance is a second contract, made by an insurer, to transfer the risk he has engaged for to another. It is in general forbidden by 19th George II. cap. 37. but is permitted to the representatives of an insurer, in case of his death, or to his assignees, in case of his bankruptcy, and it must be mentioned in the policy that it is a re-insurance.

§ 48. If the ship do not proceed on the voyage, or if, being warranted to depart with convoy, it depart without convoy, the insurance must be vacated.

If the extent of a trading voyage be uncertain, the longest one in contemplation is described in the policy; and it is agreed that part of the premium shall be returned if the voyage be shortened. In like manner, in time of war, when insurance is made without condition of convoy, it is agreed that part of the premium be returned in case the ship sail with convoy.

When a ship is warranted to depart with convoy, it is understood from the usual place of convoy, (*e. g.* the Downs), and it is insured till it arrive there.

The common proof of sailing with convoy is the production of sailing orders; but, if a ship be prevented by the weather from receiving the sailing orders, other proof may be admitted.

A ship was insured from the Thames to Halifax, warranted to sail from Portsmouth with convoy. The convoy had failed before the ship arrived there, and the underwriters declined to insure it, without convoy, for the rest of the voyage. They were found liable to return part of the premium, retaining only in proportion to the accustomed rate from London to Portsmouth. This decision seems to establish the following principle, that, when the voyage performed is only part of that described in the policy, and when the risk can be proportioned, the underwriters are bound to return part of the premium, though there be no agreement for that purpose.

But if a ship, insured only against the hazards of the sea, be taken by the enemy, the insured have no right to claim a return of premium, though the capture happen soon, under pretence that little sea-hazard was incurred.

If a ship deviate from the voyage described in the policy, without necessity, it sets aside the insurance. An intention to deviate is not sufficient to set it aside; there must be an actual deviation; and, even in that case, the insurers are liable for damages sustained before deviation.

It is no deviation to go out of the way to the accustomed place of convoy, nor to the nearest place where necessary repairs may be had. Deviation, for the purpose of smuggling, if without the knowledge of the owners, does not set aside the insurance, nor when the master is forced by the crew to return.

In insurances to the East Indies, and home, the insurers are understood to take the risk of detention in the country, and of country voyages.

§ 49. Insurance of prohibited and smuggled goods, against the risk of seizure by the government, is unlawful, and invalid. The insurers, insured, brokers, and all accessories, are liable to the fine of L. 500.

§ 50. If the insured have any information of more than common danger, they must reveal every such circumstance to the insurers, otherwise the policy is set aside.

This rule is established for the preservation of good faith; and there are several strong decisions in support of it. If a ship be spoke to leaky at sea, or if there be a report of its being lost, these circumstances must be communicated to the insurers. Even the concealment of a false report of loss vitiates the insurance; and if the ship be afterwards lost, though in a different manner, the insured will recover nothing.

But the insured are not obliged to take notice of general perils, which the insurers are understood to have in contemplation; dangerous navigation, West Indian hurricanes, enterprises of the enemy, and the like.

Insurance is not set aside by a mistake in the name of the ship or master, or the like.

Insurance may be made on an uncertain ship; on any ship that the goods may be loaded on; on any ship that A shall sail in from Virginia. In this last case, the policy is not transferred to a ship which A goes on board during the voyage.

§ 51. II. If a ship be insured at and from a port, the insurance commences immediately if the ship be there, or at its arrival there. Insurance from a port commences when the ship breaks ground; and, if it sets sail, and be driven back and lost in the port, the insurers are liable.

Insurance on goods generally continues till they be landed; but, if they be sold after the ship's arrival, and freight contracted to another port, the insurance is concluded. Goods sent on board another ship or lighter are not at the risk of the insurer; but goods sent ashore in the long boat are.

Insurance on freight commences when the goods are put on board.

Goods from the East Indies, insured to Gibraltar, and to be re-shipped from thence to Britain, were put on board a store ship at Gibraltar, to wait an opportunity of re-shipping, and were lost. The custom of putting goods aboard a store-ship being proved, the insurers were found liable.

Loss of sails ashore, when the ship is repairing, is comprehended within the insurance. What is necessarily understood, is insured, as well as what is expressed; the essential means, and intermediate steps, as well as the end. Ships performing quarantine are at the risk of the insurer.

§ 52. III. The insurers are liable for a total loss when the subject perishes through any of the perils insured against. Baratry, tho' it properly signifies running away with the ship, extends to any kind of fraud in the master or mariners. Insurance against detention of princes does not extend to ships that are seized for transgressing the laws of foreign countries.

The insurers are also liable for a total loss, when damage is sustained, and the remaining property abandoned or vested in the insurers.

If a ship be stranded, or taken, and kept by the enemy, or detained by any foreign power, or seized for the service of the government, the proprietors have a right to abandon.

But if a ship be taken by the enemy, and be retaken, or makes its escape, before action against the insurers; have the insured a right to abandon? or must they only claim for the damages sustained as an average loss? There are opposite decisions, according as the circumstances of the case were strong. When the ship was long detained, the goods perishable, the voyage entirely lost, or so disturbed, that the pursuit of it was not worth the freight, or
when

when the damage exceeds half the value of the thing, they have been found intitled to abandon; (Goss against Withers, 2 Burrow, 683.). But if the voyage be completed with little trouble or delay, they are not intitled; (Hamilton against Mendez, 2 Burrow, 1198.).

The insured cannot claim, as for a total loss, on an offer to abandon, when the loss is, in its nature, only partial; for if this were permitted, they might devolve the loss occasioned by bad markets on the insurers.

And, in all cases, the insured have their option to abandon or not. They may retain their property if they please, and claim for an average loss; and they must make their option before they claim.

If the goods be so much damaged, that their value is less than the freight, the insurers are accountable as for a total loss.

The insurers are liable for general average, when the property is charged with contribution; and for particular average, when the property is damaged, or part of it destroyed.

If the damage be sustained through the fault of the ship, the owners of the goods may have recourse, either against the master or insurers; and if the insurers be charged, they stand in the place of the owners, and have recourse against the master.

In order to prevent the insurers from being troubled with frivolous demands for average, it is generally stipulated, that none shall be charged under 5 per cent. or some other determined rate; and corn, flax, fruit, fish, and like perishable goods, are warranted free from average, unless general, or the ship be stranded.

In case of goods being damaged, the proportion of the sum insured, for which the underwriters are liable, is regulated by the proportion of the prices which the sound and damaged goods fetch at the port of destination. The prime cost of the goods is not considered, nor the necessity of immediate sale, in consequence of damage. Altho' the damaged goods sell above prime cost, the insurers are liable.

§ 53. IV. If a ship be lost, and the crew saved, the loss is proved by the evidence of the crew.

If damage be sustained, the extent is proved by an examination of the subject damaged, at the ship's arrival; and the cause by the evidence of the crew.

If the ship be stranded, evidence must be taken at the place where stranded.

Documents of loss must be laid before the underwriters, with all convenient speed; and if these be sufficiently clear, the loss should be immediately settled. The underwriters generally grant their notes at a month or six weeks date for their proportions.

If a ship be not heard of for a certain time, it is presumed lost, and the underwriters are liable to pay the sums insured, the property

ty being abandoned to them in the event of the ship's return. Six months are allowed for a voyage to any part of Europe, a year to America, and two years to the East Indies.

A ship insured against the hazards of the sea, but not against the enemy, if never heard of, is presumed lost at sea.

§ 54. V. In order that the manner of settling losses may be understood, we must explain what is meant by COVERING PROPERTY. We mentioned already, that insurances for greater sums than the insured had really at stake, were contrary to law: But some latitude is allowed in this respect; for if the owner were to insure no more than the exact value of his property, he would lose the premium of insurance, and the abatement, if any was agreed on.

For example, if he have goods on board to the value of L. 100, and insure the same at 5 per cent. to abate 2 per cent. in case of loss; then if a total loss happen, he recovers L. 98 from the insurers; of which L. 5 being applied to re-place the premium, the nett sum saved is only L. 93: But if the value on board be only L. 93, and the sum insured L. 100, he would be fully indemnified for the loss; and his property, in that case, is said to be covered.

To find how much should be insured to cover any sum, subtract the amount of the premium and abatement (if any,) from L. 100. As the remainder is to L. 100, so is the value to the sum which covers it.

In case of a total loss, if the sum insured be not greater than that which covers the property, the insurers must pay it all. If greater, they pay what covers the property, and return the premium on the overplus.

§ 55. Partial losses are regulated by this principle, that whereas the owner is not fully indemnified, in case of a total loss, unless he covers his property, therefore he should only be indemnified for a partial loss in the same proportion; and if it be not fully insured, he is considered as insurer himself for the part not covered, and must bear a suitable proportion of the loss. Therefore the value of the property is proved, and the sum required to cover it computed. If that sum be all insured, the underwriters pay the whole damage; if only part be insured, they pay their share; which is computed by the following rule: As the sum which covers the property is to the sum insured, so is the whole damage to the part for which the insurers are liable.

For example, if the value of the property be L. 360, the sum insured L. 300, the premium 8 per cent. and abatement 2 per cent.; then the sum which should be insured to cover the property is L. 400; and if damage be sustained to the extent of L. 200, the owners will recover L. 150.

§ 56. If a voyage is insured out and home, the premium outward must

must be considered as part of the value on the homeward property, and the sum necessary to cover it computed accordingly. For example, to insure L. 100 out and home, at 5 per cent. each voyage; abatement 2 per cent. we compute thus:

93 : 100 :: L. 100 : L. 107 . 10 : 6, to be insured outward, premium on L. 107 . 10 : 6 outwards, at 5 per cent. L. 5 . 7 . 6;
 93 : 100 :: L. 105 . 7 . 6 : L. 113 . 6s. to be insured home; the premium on which is L. 5 . 13s.; and if the ship be lost on the homeward voyage, from the sum insured home L. 113 6 —
 subtract the discount, 2 per cent. 2 5 3

Sum for which the insurers are liable		L. 111 — 9
Insurance out	-	L. 5 7 6
Insurance home	-	5 13 3
		11 — 9
Covered property		L. 100 — —

The student will perceive that, in the case of total loss, it is the interest of the insured to exaggerate the value of his property; and in the case of average loss to undervalue it.

BOTTOMRY, RESPONDENTIA.

§ 57. These contracts are partly in the nature of borrowing on interest, and partly in the nature of insurance.

In a bottomry contract, the lender advances money to the owner of a ship, who pledges his property in the same for his security, and engages to repay the money, with a stipulated consideration for risk and advance, when the ship returns; but if the ship be lost, the lender loses his money. The consideration ought to be equivalent to the amount of interest and insurance. Thus, if the voyage be to the East Indies, and presumed to continue two years, and the rate of insurance 20 per cent. the borrower may reasonably engage to repay L. 130, on receiving L. 100, allowing L. 10 for two years interest, and L. 20 for insurance.

Respondentia contracts are of the same kind, but secured on goods instead of the ship. The condition of re-payment is, that the goods do not perish through the hazards of the sea.

Money lent on the risk of East India voyages must be on ship or goods.

As the lender, in bottomry and respondentia contracts, is liable for the dangers of the sea, he may insure his stake; and the nature of his interest must be mentioned in the policy, that it is for money lent on bottomry or respondentia; and the insurance must not be broader, in respect of the number of ports, or continuance of time, than the bottomry.

In the East India trade, the owner of the ship or goods who bor-

rows on them, as above, cannot make insurance, for they are not at his risk, but at that of the lender. But if the value of his property be more than he has borrowed at bottomry or respondentia, he may insure the overplus: and, to prevent fraud, he must show how much he has borrowed in that manner.

If the ship do not proceed on the voyage, the bottomry or respondentia bond must be converted into a common one, at legal interest.

In East-India voyages, if the borrower on respondentia has not value on board to the extent borrowed, he must repay what was deficient, though the ship be lost.

Lenders at bottomry and respondentia are intitled to the benefit of salvage.

Such lenders have a claim on the borrower, if the ship returns, and on the insurers, if it be lost. What steps shall he take, if either becomes bankrupt before the event be determined? He may put in his claim on the bankrupt's estate, but he cannot draw any dividend from the borrower's effects till the ship arrive in safety, as nothing is due unless it arrive in safety. If the estate be distributed before its return, he loses his dividend, but is not barred by the bankrupt's certificate.

Tho' some of the foregoing regulations are in force by statute only, with respect to East-India voyages, in which these contracts are most usual, their equity extends alike to other cases.

The term *bottomry* is also applied to debts secured on ships, tho' the lender do not run the risk of the voyage.

INSURANCE AGAINST FIRE.

§ 58. There are several offices in Britain for insurance against fire. Insurances are divided into common, hazardous, and doubly hazardous, according to the nature of the subject insured; and the particulars which fall under each kind are described in their articles. When the sum insured is high, there is a higher premium per cent. demanded; and money, papers, jewels, pictures, and gun-powder, are not comprehended. If a subject be wrong described, in order that it may be insured at a lower premium, the policy is void. The benefit of a policy is transferred, by the indorsement, to the representatives of the person in whose favour it was made; and it may be transferred to other houses when the insured changes his habitation. If insurance be made on the same subject in different offices, it must be specified, by indorsement, on the policy; and, in case of loss, the offices pay proportionally. The insurers pay all expences in attempting to extinguish fire, or save goods, though not successful. If the value of a subject be insured in part, and damage be sustained, the insurers pay the whole, to the extent of the sum insured.

SECT.

SECT. V. BILLS OF EXCHANGE.

§ 59. The form and manner of conducting bills of exchange was explained Part III. Chap. I. Commercial states have experienced their utility; and, in order to support their credit, have afforded every possible security and dispatch to the possessors, and established an uniform rule for deciding controversies which arise concerning them.

The English law makes a distinction between foreign and inland bills. The custom of merchants, general or local, regulates the decision of all cases concerning the former.

Acceptance is implied if the drawer enter the bill in his book, or affix a number to it. Verbal acceptance, or promise of acceptance, under a condition which takes place, is binding. The drawer cannot limit his acceptance by any restrictions. If he annex any condition, (for example, if he engage to pay at a longer time, or a different place, from that mentioned in the bill), the acceptance is binding, in terms of the bill, and the annexed condition is ineffectual.

An acceptance cannot be recalled, though the acceptor repent before he has delivered back the bill; and, in the case of a bill left for acceptance, and lost, the drawer, in the mean time, having proved insolvent, the drawee was decreed to pay it, on the presumption that he had accepted it, and secreted it, in order to conceal his acceptance.

When a bill is refused acceptance, the possessor should cause it to be protested for non-acceptance, and intimate the same to the drawer or person from whom he received it. He may either return the bill with protest, or he may keep it till due; and if then refused, protest it again for non-payment.

If a foreign bill be not protested on the last day of grace, the possessor loses all recourse against the drawer and indorser. When protested, he may recur on the drawer, or any indorser, who are liable, *in solidum*, for the value, with damages. If an indorser pays it, he has recourse on the drawer and prior indorsers, and the first indorser on the drawer only.

A person who possessed the bill on a blank indorsation, and transmitted it to another, without indorsing it, is liable as an indorser, by the custom of merchants, on proof of such possession.

If a bill be due before it comes to hand, the possessor preserves recourse, if he protests it within a convenient time after he receives it.

The possessor may lose his recourse against some of the other parties, even after a regular protest, by an action, which marks his satisfaction in the credit of one; and, by implication, releases the others.

If several persons responsible to the possessor of a bill of exchange become

become bankrupt, the possessor is intitled to draw a dividend from the effects of each, if these do not amount altogether to more than the sum due him.

Although a bill be forged, the acceptor is obliged to pay it, and the indorsers have the usual recourse against each other.

If acceptance or payment be refused by the drawee, the bill may be accepted or paid *supra protest*, by some other person, for the honour of the drawer, or any indorser, in case the possessor consent; and the drawee may accept or pay it, with that permission, for the honour of any indorser; (See LL. § 107. page 410.) The person who pays a bill *supra protest* has recourse against all the parties liable to the possessor.

The drawer and indorsers of a bill regularly protested are answerable, not only for the sum of the bill, but for the charge of protesting it, interest, and re-exchange. The possessor being disappointed of the payment, may find it necessary to take up money, by drawing a bill of exchange on the place from which he received it; and the charge occasioned thereby is called re-exchange. It is due, by the customs of many places, although no such bill be actually drawn; and the extent is also determined by custom. Ten per cent. is allowed for re-exchange on bills from the West-Indies.

If the acceptor die, the possessor may protest the bill at the place where he resided, to preserve recourse. But if the possessor die, the bill cannot be protested; and the acceptor is not bound to pay, till the representatives of the defunct have completed their right by letters of administration.

§ 60. Inland bills are not regarded by the common law, nor regulated by the custom of merchants. They were formerly of little authority, and derive their force from particular acts of parliament; the chief of which are, 9th and 10th William III. cap. 17. and 3d and 4th Ann, cap. 9. The former appoints inland bills to be protested for non-payment; and such protest intimated within 14 days, in order to subject the drawer to damages; and requires the drawer, if a bill be lost, to grant a new one. The latter gives validity to promissory notes, and renders them indorsable; authorises the protesting of inland bills for non-acceptance; and declares bills, delivered in payment of accompts, unless protested, full payment: But bills under L. 20 may not be protested, nor, unless expressed, to be for value received. By these statutes, inland bills are brought to stand nearly on the same footing as foreign ones.

Bills, and promissory notes, under L. 1, are void; and negotiable bills, and promissory notes, under L. 5, must be payable at 21 days after date; and the subscription and indorsation must be attested by one witness; and the name and place of abode of the person to whom payable must be specified in the note, and in each indorsement.

If a bill be appointed to be paid out of a precarious fund, *e. g.* from an officer's growing subsistence, it is not within the statute; but

but if the order for payment be absolute, it is not invalidated by a direction to place it to account of a particular fund. If payable against a day, which may never take place, it is no good bill; for instance, at the arrival of a ship; for the ship may never arrive; But a bill, payable at the death of the acceptor's father, is a good bill; for though the time be at present undetermined, that event must certainly take place.

If a person gives a note on a banker in payment, the receiver is understood only to take it on condition of its being paid, unless the contrary be expressed; and he has recourse, in case of non payment, if he demand it within a reasonable time. Even though he agreed to take the note as absolute payment, if the granter knew that the person whom he drew it on was in a failing condition, he shall be answerable for it.

A merchant is answerable for his clerk or servant, who has been in the use of receiving money for him. He is even answerable after he has left his service, if recently, and before the payer knew that he had left it.

In general, no extrinsic evidence can be admitted to invalidate a bill which is good *ipsa facie*. But as this rule is intended for the security of onerous possessors, it will not avail where the possessor is a party to the fraud, or knew of it at the time of indorsement.

§ 61. The laws of Scotland, in general, adopt the custom of merchants with respect to foreign bills. The regulations concerning acceptance, protest for dishonour, and recourse, are the same as formerly mentioned. Inland bills must be protested, in case of non-payment (by 12th Geo. III. cap. 72.), before the expiration of the days of grace, and the dishonour intimated withing 14 days, otherwise there is no recourse against the drawer or indorsers.

Bills are exempted from the legal solemnities required to give validity to other deeds; and altho' executed without witnesses, they prove their own date, in questions with the heir or creditors of the debtor.

Bills bear interest from the time of falling due against the acceptor, though no protest be taken.

Bills of exchange are considered as bags of money; therefore they cannot be compensated by money paid on separate receipts, or any other debts due by a possessor; and the value cannot be arrested by the creditors of a possessor in the hands of the acceptor. These rules are intended for the security of commerce, by exempting bills from latent objections; and therefore do not extend to set aside compensation and claims against the ultimate possessor, nor to secure any possessor who knew that the bill was liable to litigation, or who did not pay the full value for it. For the same reason, altho' deeds, in favour of particular creditors, by persons who become bankrupts within 60 days, are, in general, subject to reduction, bills indorsed for

for value received cannot be questioned. It is otherwise if the bill be only granted in security of a former debt due to the ultimate possessor, or if the indorser was a notour bankrupt at the time of indorsement.

Bills which, *ex ipso facie*, are mere donations, or which contain extrinsic stipulations, inconsistent with the nature of a bill, are not valid.

A bill may be protested notwithstanding the acceptor's death, for preserving recourse, but not for obtaining damages.

The laws of Scotland are particularly favourable to bills of exchange, in regard to speedy execution.

By Act 20th, Par. 3d, Charles II. foreign bills, protested for non-acceptance, or non-payment, may be registrated in the books of council and session, or other competent judicatures; and letters of horning, on six days charge, and other summary execution, shall pass thereon, against the drawer and indorsers, if for non-acceptance, and against the acceptor, if for non-payment.

By Act 36th, Sess. 6th, William, the same privileges are extended to inland bills.

By 12th George III. cap. 72d, summary diligence is granted on accepted bills against the drawers and indorsers, (unless where the indorsement is qualified without recourse), and is competent to any indorser who pays the value, and produces a receipt for the same.

Summary execution is only granted for the sum of the bill, with interest from the date, if not accepted; otherwise from the time of falling due. Re-exchange and damages must be sued for by ordinary actions; but, in case of suspension, they may be added to the charge.

The drawer of a bill which is refused acceptance, is instantly liable for the value; contrary to the custom of other countries, where no demand against him is competent till the bill falls due.

The time which a bill remains in force, as a proof of debt and ground of action, is now limited to six years from its falling due; but the debt may be proved afterwards by the oath of the debtor.

Promissory notes are allowed the same privileges, in respect to bearing interest, transmission by indorsement, summary execution, and recourse, as bills of exchange.

SECT. VI. BANKRUPTCY.

§ 62. Justice, and the safety of commerce, require that sufficient means be used to compel the payment of debts, and fulfilment of obligations. Humanity and good policy require that the unfortunate debtor, who has done all in his power to discharge his debts, be not exposed to constant persecution for his inability, nor disabled from being useful again to society. It is therefore improper, on the one hand, that any member of society should enjoy privileges that

enable him to elude justice, or, on the other, that the compulsory methods of exacting payment should be more rigorous, or of longer duration than necessity requires.

By the more ancient Roman law, a debtor, with his wife and children, might be sold to slavery, for the satisfaction of his debts. Other nations have used a method rather milder, by obliging the debtor to work for his creditor, and the price of his labour, so far as it exceeded his subsistence, to be imputed towards the discharge of his debt. The only compulsory methods used in the modern commercial nations, are executions against his effects, and imprisonment.

Creditors may compel a prisoner detained for debt to deliver an account of his effects upon oath. If he conceals to the extent of L. 20 he shall suffer as a felon. He is liberated if he make a fair surrender.

§ 63. It remains to consider how long an unfortunate debtor may be detained in prison, and whether, after surrendering every thing, and submitting to the law, he is discharged of his debts, or liable to answer them, from the effects he may afterwards acquire.

The chief purpose of imprisonment is to compel a full surrender of the debtor's effects. Other objects may be, to punish the negligence, extravagance, or imprudence, which bankruptcy is generally occasioned by; and to excite the punctuality and diligence of the merchant by the terror of the consequences of insolvency. All these purposes may be attained, in a sufficient degree, by imprisonment of a limited duration: Yet the general law of England is for perpetual imprisonment. If the debtor recover his liberty, it is by the mercy of the creditors, or by laws, whereof the efficacy is limited to particular times or persons.

Debts are always binding in conscience, to the utmost of the debtor's power, till extinguished by payment: Yet when an unfortunate debtor has delivered all, and has nothing but the fruits of his industry to subsist on, it would be hard that these should be constantly exposed to the rapacity of his creditors; and as his efforts would be languid in so unfavourable a situation, the power of attaching them is generally of little benefit to the creditor, though of great detriment to the debtor and the public. On these considerations, the laws of some nations have granted a full or limited discharge from legal execution, to the honest but unfortunate debtor, on a fair surrender.

The most important English laws in favour of debtors are those relating to bankrupts.

A BANKRUPT must be a merchant. As that occupation is attended with greater hazard than any other, there is not the same presumption against the insolvent person as in other professions. Those who obtain their living by buying or selling, also
bankers,

bankers, brokers, factors, are capable of becoming bankrupts; so are smiths, shoemakers, and other tradesmen, who purchase materials, and sell the articles into which they are manufactured. But those who exercise a handicraft occupation, where nothing is bought or sold, do not fall under this description; nor vintners, schoolmasters, farmers, government contractors, and the like; because they only sell to those who resort to their houses, or on particular occasions. The buying or selling must be open and general. Aliens who carry on trade in this country may be bankrupts; but no person may, in consequence of his trading in another country. If a merchant has given over trade for several years, he may nevertheless be a bankrupt, in regard to the debts he contracted while a merchant; but not for any new ones, nor even for the old ones, if new securities be granted.

§ 64. A statute of bankruptcy must be sued for at the instance of one creditor, to whom the debtor owes L. 100, or of two, to whom he owes L. 150, or of more, to whom he owes altogether L. 200. The acts which render a man a bankrupt are the following: Departing from the realm; departing from his own house, or keeping privately in it, to avoid his creditors; procuring himself to be arrested, outlawed, or imprisoned, or his effects to be attached and secured; making fraudulent conveyances to a friend; lying in prison for debt for two months without finding bail; or, if intitled to the privilege of parliament, neglecting, for two months, to pay any just debt, after service of legal process.

The requisites to make a bankrupt, both in regard to the qualification of the person, and the act of bankruptcy committed, are strictly confined to the instances enumerated in the acts of parliament, and cannot be extended by implication. All proceedings on bankruptcy are carried on before the court of chancery. Upon petition by creditors authorised as aforesaid, and cause shown, and caution found, to the extent of L. 200, to prove the party a bankrupt, the Lord Chancellor grants a commission. The first business of the commissioners nominated is, to find whether the person be a bankrupt. If they find so, they give notice in the Gazette, and appoint three meetings. At one of these, assignees are chosen by the major part of the creditors, to the extent of L. 20, who have proved their debts; and, at the last meeting, at furthest, the bankrupt must surrender himself, and deliver whatever is in his power, and answer all questions tending to the discovery of his effects; but he ought not to be asked any questions which may lead him to accuse himself. The effects thus surrendered become vested in the assignees; and this extends to lands, as well as to personal property. It even extends to estates-tail, and contingent remainders, which the bankrupt himself could have disposed of. When a statute of bankruptcy is taken out, it has a retrospect to the time when the act of bankruptcy was committed. All conveyances of property, by the bank-

bankrupt, from that time, except for full value, and to persons ignorant of the bankruptcy, are null; and, if any who knew of the bankruptcy paid their debt to the bankrupt notwithstanding, they must pay it again to the assignees.

The assignees should use every legal measure for recovering the bankrupt's property, and make a dividend thereof to the creditors, under the direction of the commissioners, at the end of 12 months, and a second dividend at the end of 18 months. The dividend is made equally on all debts proved under the bankruptcy, tho' some were preferable against the debtor.

If the bankrupt does not surrender, or with-holds his books, or conceals his effects, to the extent of L. 20, with a design to defraud, he is liable to be punished with death.

The discharge of the debtor depends on his obtaining a certificate, which is the voluntary act of his creditors. The certificate bears that the bankrupt has acted fairly, and implemented what the law requires: it must be signed by four-fifths of the creditors, in number and value, but none of them creditors for less than L. 20; and passed by the Chancellor.

The bankrupt, on obtaining his certificate, is fully discharged of the debts he owed at the time of his bankruptcy, and is intitled to an allowance from his effects, to begin the world again. This allowance depends on the extent of the dividend. If under 10s. per pound, the allowance must not exceed 3 per cent. nor L. 200 in all; if 10s. the allowance is 5 per cent. but not to exceed L. 250; if 12s. 6d. the allowance is $7\frac{1}{2}$ per cent. but not to exceed L. 300; if 15s. the allowance is 10 per cent. without limitation.

The certificate is of no avail, if the bankrupt allows a fictitious claim against his estate to pass undetected; or if he has given more than L. 100 as a marriage portion to any of his children, unless he had then sufficient to pay his debts; or if he has lost more than L. 5 at a time, or L. 100 in all, by game, or lost L. 100 by stock-jobbing, within a year of his bankruptcy. And those who become bankrupts a second time, unless they pay 15s. per pound, can have no other benefit, except exemption from imprisonment.

§ 65. Another legal method of liberating debtors is by acts of insolvency. These are laws passed from time to time for discharging all debtors then in prison, on their making a surrender of their effects. The particular requisites for their discharge are prescribed in the respective laws. Prisoners indebted to the crown, or who owe more than L. 1000 to one creditor, and bankrupts refused their certificates, are generally excluded. Their future effects are liable to their creditors, except wearing apparel, bedding, and working tools, to a limited value.

§ 66. The law of Scotland, in regard to Bankruptcy, is now reduced

duced by 23 George III. cap. 18. nearly to a conformity with that of England. The description of persons who are liable to sequestration as bankrupts, comprehends merchants, and traders in gross or by retail, bankers, brokers, underwriters, manufacturers, artificers, and mechanics. The acts which constitute bankruptcy, besides those specified above for England, are being under diligence by horning, attended with arrestment, or poinding of moveables, or adjudication of heritable estate. The sequestration of the estate, real and personal, is granted by the Court of Session, upon application of creditors to the same extent as in England, or upon application of the debtor, with concurrence of such creditors. The court appoint a meeting of the creditors within three weeks to name an interim factor, and receive grounds of debts; and at a subsequent meeting, the creditors shall continue the factor, or elect another, under the direction of the court, or a trustee; the bankrupt shall be examined upon oath, and make a full discovery of his estate. All questions to be determined by the majority of the creditors in value. Creditors who have a preferable claim on the real estate to retain their preference. The first dividend of the effects to be made at the end of nine months, and the subsequent dividends at the interval of a year from the former one. Four-fifths in value of the creditors may authorize any three creditors, along with the trustee, to compound doubtful claims; and four-fifths, in number and value, may order the sale of such debts and effects, as remain unpaid at the end of three years, by public auction. With concurrence of the same majority, the court may grant the bankrupt a protection from personal diligence, during the dependence of the sequestration, and a discharge of his debts afterwards, so far as respects his person and future personal estate; but which shall not extend to equipage or heritable property. The same majority may grant the bankrupt like allowances as he is intitled to in England, in no case exceeding L. 400. Persons swearing falsely as to their effects, are held guilty of perjury and fraudulent bankruptcy, are incapacitated from holding any office, and forfeit all benefits of the statute.

By the laws of Scotland, no person can be imprisoned, or obliged to find bail, during the dependence of a civil action, unless the creditor make oath that he has credible information of the debtor's being *in meditatione fugae*, i. e. intending to fly from justice. His effects, however, may be attached by arrestment in the hands of debtors or possessors. Warrant for arrestment is granted by the court before which the action is raised.

Execution, after judgment, may be obtained against his goods, by poinding, and against his person, by caption, or act of warding; and the debts owing him may be recovered by process of forthcoming against his debtors, founded on an arrestment laid in their hands. No diligence can be executed against a debtor's person or effects till after a charge of six days at least.

§ 67. When several creditors have arrested in the hands of the same person, the arrestments were formerly preferable, according to the priority of time, altho' there was not above three hours of difference. As this gave an unreasonable preference to those creditors who had earlier notice of their debtor's insolvency, and occasioned much expence and litigation, it is now enacted, that when an arrestment or poiding is executed within 30 days before bankruptcy, or four months after, any other creditors, making claim within these four months, shall be intitled to an equal proportion of the subjects arrested or poided.

The term bankrupt, in the Scots law, is not confined to men of a particular profession, but signifies any person whose insolvency appears by the circumstances formerly mentioned. All alienations to one creditor, in preference of another, within sixty days of his bankruptcy, and all alienations hurtful to prior creditors, in favour of conjunct and confident persons, or without a necessary or just price really paid, are subject to reduction.

§ 68. The indulgencies granted by the laws of Scotland to unfortunate debtors are, liberation, on a *cessio bonorum*, and on the act of grace.

By the former, a prisoner may apply to the court of session for his discharge, on delivering all his effects, on inventory and oath, for the benefit of his creditors. This is insisted on by way of action, to which all the creditors are summoned at thirty days; and, if no fraud appear, it is granted in course. The practice of obliging debtors to wear a dyvor's habit is gone into disuse, though the court is prohibited to dispense with it, unless the bankruptcy be proved to have proceeded from misfortune, or if it has been occasioned by illicit trade. If a debtor, thus released, acquires an estate afterwards, it may be attached by his creditors, unless so far as is necessary for his subsistence.

By the act of grace, a prisoner may make oath before a magistrate, that he has not wherewith to maintain himself; and the magistrate must set him at liberty within 10 days, on his delivering his effects, unless the creditors aliment him. The act of grace is not barred by former fraud; but it is not granted to prisoners confined for fines or damages *ex delicto*.

§ 69. Execution against a debtor's real estate, is by inhibition or adjudication. Inhibition prevents the voluntary alienation of the estate, or renders the person to whom it is alienated liable for the debt; and it gives a preference to the claim of the inhibitor, in respect of debts contracted afterwards, and secured on the estate. Adjudication intitles the creditor to enter into possession of the estate, and conveys to him the property thereof, unless redeemed within 10 years, judgment being obtained, on a declarator, raised for that purpose. Adjudications obtained within year and day of the first,

are intitled to equal rank, and are preferable to those obtained afterwards. If it be proved that an estate is bankrupt, that is, that the debts affecting it exceed the value, it shall be sold, by authority of the Court of Session, and the price divided among the creditors; regard being had to the priority of their claims.

SECT. VII. ARBITRATION.

§ 70. We shall conclude this Abstract of the Mercantile Law with some observations on the amicable way of terminating controversies, by referring them to the decisions of persons chosen by the parties. This practice is common in mercantile affairs; and contracts of copartnery and policies generally contain a clause, binding the parties to refer any controversy which may arise to this method of decision.

The deed by which parties bind themselves to acquiesce in the decision is called an *arbitration bond* in England, and a *submission* in Scotland. It should state the particular claims submitted, or may extend to all differences subsisting between the parties; and it should limit the time of pronouncing sentence. The judges are chosen, one or more by each party, and are called *arbiters*, or *arbitrators*; and are generally impowered, in case their opinions differ, to choose an oversman, or umpire. Sometimes the umpire is appointed by the parties in the deed of submission. Their sentence is called an *award* in England, and a *decreet-arbitral* in Scotland. It must be confined to the points referred to, and pronounced within the time limited; and, in case of mutual claims, must decide the differences on both sides; and it must be given in writing. When these requisites are observed, the decision is liberally constructed, and cannot be set aside in England, except unduly obtained, or grossly partial or illegal; nor in Scotland, except on proof of bribery or falsehood. The arbitration-bond in England often contains a clause, that the award shall be made a rule in any court of record; and the submission in Scotland, frequently contains a clause of registration for the purpose of legal diligence. If these clauses be wanting, the decision may still be supported by an ordinary action. If it be necessary to compel the appearance of witnesses before arbiters, the courts will grant warrant for that purpose.

C H A P. IV.

PUBLIC FUNDS.

§ 71. **W**E shall conclude this treatise with an explanation of the public funds; a subject intimately connected with the mercantile state of the nation.

The term *fund* signifies any sum of money appropriated for a particular

ticular purpose. Thus, that part of the national revenue which is set aside for the payment of the national debt, is called the *sinking fund*. But, when we speak of the funds, we generally mean the large sums which have been lent to government, and constitute the national debt; and for which the lenders, or their assignees, receive interest from revenues allotted for that purpose. The term *Stock* is used in the same sense, and is also applied to the sums which form the capital of the Bank of England, the East India and South Sea Companies; the proprietors of which are intitled to a share of the profits of the respective companies.

The practice of funding was introduced by the Venetians and Genoese, in the sixteenth century, and has been adopted since by most of the nations in Europe. Princes had often borrowed money, in former times, to supply their exigencies, and sometimes mortgaged their territories in security; but these loans were generally extorted, and their payment always precarious; for it depended on the good faith and success of the borrower, and never became a regular burden on posterity. The origin of funds is derived from the peculiar manners and circumstances of modern Europe. Since the invention of gun-powder, and the progress of commerce, the military occupation has become a distinct employment in the hands of mercenaries; the apparatus of war is attended with more expence; and the decision of national quarrels has often been determined by command of money, rather than by national bravery. Ambitious princes have therefore borrowed money, in order to carry on their projects with more vigour; weaker states have been compelled, in self-defence, to apply to the same resource; the wealth introduced by commerce has afforded the means; the regularity of administration, established in consequence of the progress of civility, has increased the confidence of individuals in the public security; the complicated system of modern policy has extended the scenes of war, and prolonged their duration; and the colonies established by mercantile nations have rendered them vulnerable in more points, and increased the expence of defending them.

When a greater sum has been required for the annual expence than could easily be supplied by annual taxes, the government have proposed terms, to their own subjects, or foreigners, for obtaining an advance of money, by mortgaging the revenue of future years for their indemnification. This mortgage may either be for a limited period, or perpetual. If the sum allotted annually for the benefit of those who advance the money be considerably greater than the interests of the sums advanced, they may agree to accept of such allowance, for a limited time, as a full equivalent. Thus, they may either agree for the casual produce of the revenue assigned; or a fixed annuity for a greater or less number of years; or a life annuity to themselves or nominees; or an annuity for two or more lives; or an annuity, with the benefit of survivorship, called a *tontine*, in which

which scheme, the whole sum to which the original annuitants were intitled, continues to be distributed among the survivors.

§ 72. The establishment of the funds was introduced in Britain at the Revolution, and has since been gradually enlarged, and carried to an amazing extent. The various methods abovementioned have been used in their turns; but perpetual annuities have been granted for the greatest part; and, even when the money was originally advanced on other conditions, the lenders have been sometimes induced, by subsequent offers, to accept of perpetual annuities, instead of the former terms. The debt for which perpetual annuities are granted, is called the *redeemable debt*, and the other is called the *irredeemable debt*. Although the debts thus contracted by government are seldom paid for a long term of years; yet any creditor of the public may obtain money for what is due him when he pleases, by transferring his property in the funds to another; and regular methods are established for transacting these transfers in an easy manner. By means of this, the stocks become a kind of circulating capital, and have the same effect, in some respects, as the circulating money in the nation. When a stockholder transfers his share, he may sometimes be able to obtain a greater price than the original value, and, at other times, be obliged to accept of a less one. The value of the funds depends on the proportion between the interest they bear and the benefit which may be obtained by applying the money to other purposes. It is influenced by the plenty or scarcity of money, and by the quantity of the public debt; and it is impaired by any event which threatens the safety, or weakens the credit, of the government.

§ 73. The business of stock-jobbing is founded on the variation of the prices of stock. Persons possessed of real property may buy or sell stock, according to the notion that the value is likely to rise or fall, in expectation of making profit by the difference of price. And a practice has taken place among persons who often possess no property in the funds, to contract for the sale of stock against a future day, at a price now agreed on. For instance, A agrees to sell B L. 1000 of bank-stock, to be transferred, in 20 days, for L. 1200. A has, in fact, no such stock; but, if the price of bank stock, on the day appointed for the transfer, should be only 118 per cent. A may purchase as much as will enable him to fulfil his bargain for L. 1180, and thus gains L. 20 by the transaction; on the contrary, if the price of bank-stock be 125 per cent. he will lose L. 50. The business is generally settled without any actual purchase or transfer of stock, by A paying to B, or receiving from him, the difference between the current price of the stock, on the day appointed, and the price bargained for.

This practice, which is really nothing else than a wager concerning the price of stock, is contrary to law, yet it is carried on to a great extent. In the language of Exchange-alley, where mat-

ters of this kind are transacted, the buyer is called a *bull* and the seller a *bear*. As neither party can be compelled by law to implement these bargains, their sense of honour, and the disgrace and loss of future credit, which attends a breach of contract, are the principles by which the business is supported.

§ 74. The interest or dividend on the stock is paid half-yearly; and the purchaser has the benefit of the interest due on the stock he buys from the last term to the time of purchase. Therefore the prices of the stocks rise gradually, *caeteris paribus*, from term to term, and fall at the term when the interest is paid. In comparing the prices of the different stocks, it is necessary to advert to the term when the last interest was paid; and allowance being made for this circumstance, the prices of all the government stocks, which bear interest at the same rate, must be nearly the same, as they all depend on the same security.

When a loan is proposed, such terms must be offered to the lenders, as may render the transaction beneficial; and this is now regulated by the prices of the old stocks. If the stocks, which bear interest at 4 per cent. sell at par, or rather above, the government may expect to borrow money at that rate; but, if these stocks are under par, the government must either grant a higher interest, or some other advantage to the lenders, in compensation for the difference. For this purpose, besides the perpetual annuity, another annuity has sometimes been granted for life, or for a term of years. Lotteries have frequently been employed to facilitate the loan, by intitling the subscribers to a certain number of tickets, for which no higher price is charged than the exact value distributed in prizes, though their market price is generally L. 2 or L. 3 higher. Sometimes an abatement of a certain proportion of the capital has been granted, and a lender intitled to hold L. 100 stock, though, in reality, he advanced no more perhaps than L. 95.

It belongs to the Chancellor of the Exchequer to propose the terms of the loan in parliament; and he generally makes a previous agreement with some wealthy merchants, who are willing to advance the money on the terms proposed. The subscribers to the loan deposit a certain part of the sum subscribed, and are bound to pay the rest by instalments, or stated proportions, on appointed days, under pain of forfeiting what they have deposited. For this they are intitled, perhaps, not only to hold their share in the capital, but to an annuity for 10 years, and to the right of receiving a certain number of lottery-tickets on advantageous terms. They may sell their capital to one person, their annuity to a second, and their right to the tickets to a third. The value of all these interests together is called *omnium*; and, in order to obtain a ready subscription, it ought to amount to L. 102, or upwards, on L. 100 of capital. This difference is called the *bonus* to the subscribers.

§ 75. The capital advanced to the public, in the form of transferable stocks, and bearing interest from taxes appropriated for that purpose, is called the *funded debt*. Besides, there is generally a considerable sum due by government, which is not disposed of in that manner, and therefore is distinguished by the appellation of the *unfunded debt*. This may arise from any sort of national expence, for which no provision has been made, or for which the provision has proved insufficient. The chief branches are exchequer-bills, navy-bills, and ordnance-bills.

§ 76. In time of war, the public expences, since the Revolution, have always been much greater than the annual revenue; and large sums have consequently been borrowed. In time of peace, the revenue exceeds the expence, and part of the public debts have frequently been paid off. But though there have been more years of peace than of war since the funds were established, the debts contracted during each war have much exceeded the payments during the subsequent peace. This will appear by the following abstract of the progress of the national debt.

Debt at peace with Ryswich, 1697	L. 21,515,772
Debt at the beginning of war 1701	- 16,394,701
Discharged during peace 1697 to 1701	- 5,121,071
Debt at peace of Utrecht 1714, including value of annuities afterwards subscribed to South-Sea Stock	55,282,978
Contracted in war 1701 to 1714	- 38,888,277
Debt at beginning of war 1740, including L. 1,000,000 charged on civil list	- 47,954,623
Discharged during peace 1714 to 1739	- 7,300,355
Debt at Peace of Aix-la-chapelle, 1748	- 79,103,313
Contracted during war 1740 to 1748	- 31,238,690
Debt at beginning of war 1756	- 73,289,673
Paid off during peace 1740 to 1756	- 5,903,640
Debt funded at the peace 1763, including L. 9,839,597 then owing, which was funded in the subsequent years	- 133,959,270
Besides this, there was about L. 6,000,000 of debt paid off, without ever being funded.	
Funded debt, 1775	- 125,000,000
Paid off during peace 1763 to 1775, besides unfunded debt above-mentioned	- 8,959,270
Funded debt at the peace 1783	- 211,363,254
Besides about L. 19,000,000 unfunded debt, part of which has been funded since.	

F I N I S.



S U P P L E M E N T

T O

HAMILTON'S INTRODUCTION

T O

M E R C H A N D I Z E.

*Containing the ANSWERS to all the QUESTIONS proposed in that WORK.**

ADDITION.
 § 10. 20502188
 24229845
 4019754
 442877
 § 14. L. 5599 3 6
 1327 5 3
 828 17 10

Averdupois weight.
T. C. gr. lb. oz. dr.
 26 19 0 20 0 0
 42 7 1 3 0 0
 0 6 3 9 1 4

Troy weight.
lb. oz. dwt. gr. m.
 8 9 16 9 0
 139 3 8 0 0
 59 1 18 0 2

English dry measure.
Q. B. G. p.
 58 6 3 1
 79 7 2 0
B. P. G. p.
 48 1 1 6

Scots dry measure.
Ch. B. F. P. L.
 25 9 0 3 2
 102 7 1 1 3
 4098 Bolls.

ADDITION.
 § 14.
English land measure.
A. R. P. Y.
 1434 3 5 22 $\frac{1}{4}$
 1480 0 32 4 $\frac{1}{4}$
 2223 2 8 18 $\frac{1}{4}$

Scots land measure.
A. R. F. E.
 159 1 12 10
 470 2 14 15
 183 2 3 28

Long measure.
M. F. P. Y. ft. in.
 24 6 33 4 $\frac{1}{2}$ 0 0
 125 7 18 3 2 2
 205 L. 1 M. 4 F.

Time.
D. H. min. sec.
 998 16 9 57
 25 2 9 53
 1668 yrs, 218 days.

SUBTRACTION.
 § 16. 78782
 315265
 § 18. L. 625 11 6
 528 13 3
 909 19 11
 A

SUBTRACTION.
T. cwt. gr. lb.
 § 18. 2 19 3 5
 0 6 0 20
 2 14 2 25
lb 3 3 3 gr.
 2 11 6 2 17
 1 11 1 1 17
 2 9 5 0 18
A. R. P. Y.
 2 1 38 18
 11 3 12 17 $\frac{1}{4}$
 84 0 3 30
A. R. F. E.
 7 1 7 5
 52 2 8 34
 9 3 38 19
M. F. P. Y.
 1 6 32 4 $\frac{1}{4}$
Q. B. G.
 7 3 7
Ch. B. F. P. L.
 2 10 1 3 2

§ 19. *Exercises.*
T. C. Q. lb.
I. Gross 8 2 1 15
Tare 0 6 3 13

Nett 7 15 2 2
 § 19. *Ex-*

* The fractions are sometimes omitted, except in the elementary rules and the chapters on the doctrine of fractions.

INTRODUCTION TO MERCHANDIZE.

3

MULTIPLICATION.

§ 23.

Quest.	
1.	34143633
2.	638348300
3.	243669680
4.	3046914086
5.	5696398656
6.	651297105
7.	471333237564
8.	516583319850
9.	166801118
10.	141518832
11.	1059648564
12.	1977335789
13.	3652127142
14.	2719416339
15.	33376666254372
16.	5943105023679

§ 25.

Quest.	
1.	395424
2.	770504
3.	8124048
4.	6136032
5.	20818625
7.	20461356
8.	32811219

§ 27.

Quest.	
1.	55836
2.	37816218
3.	7689303
4.	34853028
5.	5721783

§ 28.

Quest.	
1.	96831
2.	65232
3.	1231846
4.	5076918
5.	159892
6.	68355
7.	25155

MULTIPLICATION.

§ 29.

Quest.	
1.	191170638
2.	1663515480
3.	27834141
4.	79037644
5.	620763174
6.	4052782770
7.	5963148

Quest.

1.	4591584
2.	54889716
3.	27465480
4.	2927547870
5.	61430517648
6.	1166471010
7.	1440751392
8.	3148081636

§ 32.

Quest.	
1. L.	341 6 1½
2.	1423 15 0
3.	1095 5 4
4.	53442 8 1
5. T.	4 13 3 18
6. Ac.	88 — 29 19
7. lb.	76 7 8 23
8. Ch.	8 13 2 2

§ 33.

Quest.	
1. L.	4547 16 3
2.	94694 17 0
3.	41670 0 0
4.	52673 8 9
5.	876 4 7½
6. T.	33 5 2 8
7. lb.	148 8 1 12
8. A.	415 0 10 0
9. C.	423 9 3 0
10. M.	304 0 12 2

Quest. § 34.

1. L.	7715 8 6
2.	24904 0 2
A	2

MULTIPLICATION.

§ 34.

Quest.	
3. L.	49458 14 0½
4.	307345 4 6
5.	22499 5 11½
6. T.	53 0 2 15
7. A.	1097 0 5 0
8. Ch.	5 12 3 1
9. lb.	39 11 6 0
10. Yards	134 0 2

§ 35.

Quest.	
1. L.	6124 0 4
2.	51680 11 3½
3.	11121 11 5
4. T.	53 18 3 18
5. A.	996 0 17 0
6. Q.	182 1 4

Quest. § 36.

1. L.	1282872 10 0
2.	792480 0 0
3.	5012519 10 9
4. T.	358 2 3 2
5. A.	1104629 2 2 6
6. lb.	743 2 7

§ 38.

Quest.	
1. Balls,	6570
2. Men,	14985
3. Grs.	46163925
4. Stones,	119850
5. Balls,	75834
6. L.	47 1 4
7.	40 0 0
8.	1276 16 0
9.	337 14 8
10.	977 1 6
11.	361 19 3
12.	887 9 10
13. T.	18 10 1 4
14.	15 3 1 4
15.	267 14 1 19
16.	2582 14 3 12
17.	78 8 2 2
MUL-	

MULTIPLICATION.

§ 38.				
Quest.				
18. Gr.	3	7	2	12
Nett.	3	3	1	8
19. lb.	27	4	2	12
20. Cwt.	7	2	0	
21. Furl.	2	4	3	0
22.	L.	44676000		
23.	Feet,	31820		
24.		1108		
25.		2464		
26.		30		
27.	Staves,	9200		
28.	Bottles,	9645		
29.	Her.	612000		
30.	Seeds,	8640		
31.	Letters,	2810304		
32.	L.	225	15	9
33.		302	5	0
34.		31	10	0
35.		69	12	0
36.		83	18	9
37.		2260	8	4

MULTIPLICATION.

§ 38.				
Quest.				
38.	L.	159	2	0
39.		47951	10	7½
40.		626	5	11
41.	T.	1	5	1 0
42.		9	0	1 20
43.		18	1	2 27
44.		21	12	1 21
45.		2	8	1 21
46.		3	15	1 8
47.	Qrs,	1088	3	4
48.	Acres,	156	1	4
49.	Yards,	9500		
50.	L.	7	10	0
51.	Feet,		72	
52.	Bolls,		212	
	L.	159	0	0
	T.	17	0	2 24
53.	L.	3885	0	0
54.		104	12	6
55.		9	5	3
56.	Bolls,	843	12	
	T.	48	4	1 4

MULTIPLICATION.

§ 38.				
Quest.				
57.	Pence,	446128		
58.	Farth.	364455		
59.	Far.	5564528901		
60.	lb.	33233		
61.	Grains,	20513		
62.	Grains,	38158		
63.	Ells,	108454		
64.	Yards,	75594½		
65.	L. Scots,	5748329		
66.	Mks Scots,	9450		
67.	Pence,	10988114		
68.	Farth.	9599999		
69.	Grains,	84330		
70.	Inches,	222264		
71.	Drams,	103541		
72.	Lippies,	5320		
73.	Sec.	31556880		
74.	Pints,	19264		
75.	L. Scots,	2190		
76.	Mks Scots,	28296		
77.	Sixpences,	5250		

MENSURATION.

§ 48.				
Quest.				
1.	F.	404	6	11 0 0
2.		484	11	6 0 0
3.		160	5	6 6 0
4.		154	4	11 7 6
5.		469	0	4 0 0
6.		255	1	3 0 0
7.		97	4	5 0 0
8.		0	0	8 7 11
9.		94 yards,	5 f.	
10.		1666 yards,	7 f. 72 in. *	
11.		42 yards,	7 f. 36 in.	

* When in. is marked on the line with the figures, it signifies square or cubical inches according to the question. The denomination next to the feet, when F. is marked at the beginning, is inches, in the sense explained § 43. 50.

MENSURATION.

§ 48				
Quest.				
12.		19 yards,	2 f. 108 in.	
13.		75 yards,	8 f. 51 in.	
14.		350 yards,		
§ 53.				
Quest.				
1.	F.	4969	2	7 6
2.		1175	7	6 0
3.		3944	fath.	16 f.
4.	F.	47	8	2 11 2 0
5.		0	1	9 7 2 4
6.		22	6	0 7 6 0
7.		8740 yards,	22 f. 72 in.	
8.	I	108800 yards		
9.		56250 yards		
		5625 horses.		

DIVISION.

DIVISION.

§ 56.

Quest.

1. 1576
2. 133
3. 8583
4. 10809
5. $2037\frac{41}{111}$
6. $151232\frac{258}{848}$
7. 729
8. 9908
9. $99\frac{2158}{8017}$
10. 89
11. 1018
12. $104307\frac{612}{709}$

§ 59.

Quest.

1. 347
2. $208\frac{3}{8}$
3. $36\frac{3}{8}$
4. $45\frac{6}{8}$
5. $8\frac{1}{2}$

§ 60.

Quest.

1. $82\frac{148}{100}$
2. $16\frac{507}{800}$
3. $8\frac{1825}{9000}$
4. $11\frac{5095}{1100}$

§ 62.

Quest.

1. $680\frac{83}{99}$
2. $23\frac{778}{990}$
3. $6755\frac{113}{999}$
4. $527\frac{8903}{9999}$

§ 65.

Quest.

1. L. 138 5 2
2. 5 7 1
3. 36 17 4
4. 19 13 $11\frac{10}{19}$
5. C. 3 2 $8\frac{1}{4}$
6. 21 0 3

DIVISION.

§ 66.

Quest.

7. Ac. 1 3 3 14
8. T. 1 15 3 $2\frac{2}{7}$

§ 67.

1. 379
2. 42
3. $108\frac{2320}{24079}$
4. $5\frac{64}{89}$
5. 254
6. $100\frac{1}{2}$

§ 68.

Quest.

1. 251 trees
2. 62 casks
3. L. 26 12 $8\frac{3}{4}$
4. Cwt. 12 3 25
5. Ac. 364 0 20
6. 1 ft. 13 lb.
7. 6 s. $3\frac{3}{4}$ d.
8. 28 yds, 3 qrs
9. 590 guineas
10. 17 casks
11. 64 horses
12. 21 days
13. $1415\frac{211699}{21000} m.$
14. $35\frac{416}{100}$ yards
15. $26\frac{8}{9}$ yards
16. $16\frac{66}{100}$ feet
17. 23 yds. 1 qr.
18. 2431 slates
19. L. 695 3 $11\frac{1}{4}$
20. T. 1 8 2 24
21. A. 37 3 9 7
22. 2 s. $7\frac{1}{2}$ d.
23. $2\frac{1}{4}$ d.
24. 14 s. 8 d.
25. 5 dwt. $14\frac{70}{1111}$ qr.
26. 38 yds. 2 qr.
27. $171\frac{11}{11}$ casks
28. L. 41 13 4 p.mh.
9 12 $3\frac{1}{2}$ p.wk.
1 7 $4\frac{80}{100}$ p.day.

DIVISION.

§ 68.

Quest.

29. 173 d. 3 h. 20 m.
30. $55\frac{11}{11}$ seconds
31. 1144 feet
32. 2 yds. 3 qrs.
33. 4 d. per yard
 $22\frac{1}{2}$ men
34. B. 2 3 2 $3\frac{10}{11}$
R. 1 14 $26\frac{10}{18}$
35. $5\frac{3}{4}$ strokes
59 $1\frac{1}{2}$ lb.
36. 17 f. 28 ells
9 reapers
8 d.
18 s.
12 s. 8 d.
3 acres
2 a. 17 f. 28 e.
6 s.
26 f. 24 ells
37. 24 seconds
38. L. 43189 5 0
39. 369 0 $11\frac{1}{4}$
40. T. 3301 17 3
41. lb. 1284 3 0 6
42. Ac. 93 1 14 9
43. L. 3160 10 0
44. M. 59 7 24 5 1 11
45. R. 158 200 8 53 20
46. L. 65322 13 6
47. lb. 247 8 5 1 10
48. T. 686 15 3 25
49. Ac. 7 0 32 4
50. L. 79 16 8
51. 4087 5 0
52. Q. 5910 3 2 1
53. lb. 14 11 5

§ 71.

Quest.

1. 68060 guineas
2. L. 7915173
3. 11094642 merks
4. L. 783641 5

Divi.

DIVISION.				RULE of PROPORTION.				RULE of PROPORTION.			
§ 71.				§ 85.				§ 89.			
Quest.				Quest.				Quest.			
5. L.	384215	6	8	18.	15 men			14.	95 lb. averd.		
6.	62614	16	0	19.	72 days				117 lb. of Lyons		
7.	20903	8	0	20.	187½ or 188			Distributive Proportion.			
8.	13269	Johan.		¶ 21. L.	133	6	8	§ 90.			
9.	Drs.	170	2 8	22.	30	16	0	Quest.			
10.	M.	1	5 25 2½	23.	12	10	9½	1. A. L.	20	18	7—440
11.		231	merks	24.	30	5	7½	B.	10	19	9—360
12.	L.	958		25.	400	acres		C.	13	7	1—920
13.		3526	moid.	26.	103⅓	yards		2. A.	158	3	4
14.		3793	half-gs.	27.	145	persons		B.	99	4	8
15.	L.	48014	8s.	28.	94	boys		C.	189	16	0
16.	L.	1665			87	girls		D.	137	16	0
17.		159465½	½ crs.	29.	1050	bolts		A. R. P.			
18.		4287½	moid.	30. Hds.	57	9		3. A.	95	2	10
19.		3682⅔	ells	L.	857	2	10½	B.	191	0	20
20.	R.	72626	125	31. Drs.	49	3	5	C.	286	2	30
21.	L.	10	16 7½	32.	753444	l. 5s.		D.	573	1	20
22.		67	7 8		20001	men		4. A. L.	81	5	0
RULE of PROPORTION.				¶ 33.	112½	days		B.	46	17	6
Simple Proportion.				34.	81	men		C.	22	10	0
§ 85.				35.	50	days		D.	17	10	0
Quest.				36.	16	barrels		E.	30	12	6
1.	4s.	7d.		37.	137½	acres		Pr.	51	5	0
2.	2s.	8½d.		38.	24	years		5. Ground. Gallery.			
3.	L.	1	10s.	39.	13½	acres		A.	154		42
4.	lb.	6	0 4 10½	40.	10½	men		B.	364⅓	99⅓	75
5.		114		Compound Proportion.				C.	308		84
6.	L.	10	14 3½	Quest.	§ 89.			D.	176		48
7.		1600	0 0	1.	200	men		E.	203⅓	55⅓	75
8.		4224	yds.	2.	40	acres		F.	121		33
9.	L.	3205	14 3½	3.	41½	days		G.	264		72
10.		2492	bolts	4.	3 m.	6f.		H.	211⅓	57⅓	102
11.		271½	barrels	5.	62l.	10s.		I.	68⅓	18⅓	75
12.	L.	13	1 7½	6.	17½	men		6. L.		L.	
13.		0	6 8 p.m.	¶ 7. L.	104	2 4⅓		Captain			333 68
		0	1 6⅓ p.w.	8.	2	10 5⅓		3 Lt. & sur.	125 0 0		375 0 0
		0	0 2½ p.d.	9.	11½	days		8 Officers,	31 5 0		250 0 0
14.		28	2 3½	10.	240	bolts		100 Priv.	10 8 4	1041	13 4
¶ 15.		483½	bolts	11.	268½	sheep		L. 2000 0 0			
16.	lb.	2	8	12. L.	37	11 6⅓		Share of a private man.			
17.		20	days	¶ 13.	18657	bolts		7. A. R. P.			
					53	lasts		7	3	22	

INTRODUCTION TO MERCHANDIZE.

7

RULES for PRACTICE. RULES for PRACTICE. RULES for PRACTICE.

§ 93.

Quest.

1. L.	187	10	0
2.	284	13	4
3.	118	15	0
4.	627	0	0
5.	109	7	6
6.	742	10	0
7.	347	5	0
7.	47	14	8
8.	114	9	0
10.	16	5	0
11.	31	4	6
12.	161	17	4
13.	80	1	8
14.	1457	6	8
15.	2140	15	0
16.	1484	4	0
17.	448	17	6
18.	63	7	0
19.	29	19	4
20.	10	15	0
21.	17	19	6
22.	60	6	6
23.	432	12	0
24.	462	7	6

§ 94.

Quest.

1. L.	1415	11	0
2.	653293	17	0
3.	1931	17	0
4.	12177	2	0
5.	18332	6	0
6.	33521	14	0
7.	22897	10	0
8.	51493	8	0
9.	33851	4	0
10.	5077	16	0
11.	8258	5	0
12.	53897	13	0
13.	24214	9	0
14.	21079	7	0
15.	23280	19	0
16.	33758	16	0

§ 94.

Quest.

17. L.	15897	0	0
18.	61186	8	0
19.	21238	4	0
20.	10480	8	0

§ 98.

Quest.

1. L.	596	18	11
2.	360	4	6
3.	540	11	9
4.	1237	15	0
5.	7826	1	8
6.	1362	15	1
7.	411	6	8
8.	152	1	3
9.	305	6	8
10.	271	14	0
11.	24	0	3
12.	133	18	8
13.	7489	4	7
14.	3222	12	0
15.	229	0	10
16.	313	15	6
17.	62	11	0
18.	253	2	0
19.	33	15	0
20.	56	12	2

§ 99.

Quest.

1. L.	754	2	7
2.	909	10	3 $\frac{1}{2}$
3.	1858	16	4 $\frac{1}{2}$
4.	52	16	11
5.	179	0	0 $\frac{1}{2}$
6.	562	9	11 $\frac{1}{2}$

§ 100.

Quest.

1. L.	66	13	6
2.	168	5	3
3.	14	6	10 $\frac{1}{2}$
4.	9	9	7 $\frac{1}{4}$
5.	91	3	9

§ 100.

Quest.

6. L.	4	3	8 $\frac{1}{2}$
7.	108	16	8 $\frac{1}{2}$
8.	1620	12	0
9.	5931	13	1 $\frac{1}{2}$
10.	5121	15	11 $\frac{1}{2}$
11.	32253	18	8 $\frac{1}{4}$
12.	6989	14	0

§ 104.

Quest.

1. L.	10015	16	8
2.	10526	12	0
3.	2201	14	1
4.	1011	6	10
5.	773	17	8
6.	4877	0	1
7.	13071	5	6
8.	6917	17	1 $\frac{1}{2}$
9.	38067	18	6
10.	941	11	3
11.	40847	4	8
12.	29196	4	6
13.	24523	13	9
14.	3996	5	4
15.	2419	4	3
16.	5087	7	5 $\frac{1}{4}$
17.	52487	5	6
18.	49759	2	11
19.	9701	14	0
20.	10120	0	8

§ 106.

Quest.

1. L.	2385	14	4
2.	194100	4	0
3.	923830	8	6
4.	1145	10	0
5.	155744	17	6
6.	12972	16	10 $\frac{1}{4}$
7.	23660	4	8
8.	214204	16	6
9.	83672	15	6
10.	77439	1	8

RULES

RULES for PRACTICE. RULES for PRACTICE. RULES for PRACTICE.

§ 106.

Quest.	
11. L.	7210 14 $7\frac{1}{2}$
12.	93692 16 0

§ 108.

Quest.	
1. L.	447 18 4
2.	5808 4 7
3.	2115 1 8
4.	194 18 $1\frac{1}{2}$
5.	3610 7 $2\frac{1}{4}$
6.	2283 8 4
7.	55333 17 $4\frac{3}{4}$
8.	781 3 $1\frac{7}{8}$

§ 109.

Quest.	
1. L.	58 18 $0\frac{1}{4}$
2.	28 3 $9\frac{3}{4}$
3.	83 13 $0\frac{5}{11}$
4.	2 17 0
5.	9 8 $5\frac{1}{4}$
6.	52 9 8
7.	125 16 $4\frac{7}{8}$
8.	122 16 6

§ 110.

Quest.	Cwt.	q.	lb.
1. Nett	295	1	$14\frac{1}{2}$
2.	1	0	10
3.	0	0	$20\frac{5}{11}$
4.	379	2	17
5.	564	2	$26\frac{1}{4}$
6.	14	0	2
7.	371	3	27

§ 110.

Quest.	
8.	446 stones
9.	1387 gallons
10.	$555\frac{1}{2}$ acres
	Commission.

§ 111.

Quest.	
1. L.	20 16 0
2.	13 8 $7\frac{1}{2}$
3.	3 11 $9\frac{1}{2}$
4.	20 10 0
5.	3 16 5
6.	14 15 9
7.	1 10 $5\frac{1}{4}$
8.	9 0 $10\frac{1}{4}$
9.	11 16 3
10.	198 11 $1\frac{1}{4}$
11.	29 4 $3\frac{3}{4}$
12.	61 6 $4\frac{3}{4}$

Interest.

§ 116.

Quest.	
1. L.	1 18 $1\frac{1}{2}$
2.	1 10 4
3.	1 0 $4\frac{1}{2}$
4.	4 4 0
5.	17 16 $10\frac{3}{4}$
6.	17 11 $9\frac{3}{4}$
7.	49 2 $5\frac{3}{4}$
8.	5 13 $0\frac{1}{2}$
9.	6 5 $8\frac{1}{2}$
10.	5 11 $4\frac{1}{2}$

§ 116.

Quest.	
11. L.	9 19 $1\frac{1}{2}$
12.	30 2 $5\frac{3}{4}$
13.	5 8 $9\frac{3}{4}$
14.	1 1 $9\frac{1}{2}$
15.	107 1 2
16.	4 8 $10\frac{3}{4}$

§ 119.

Quest.	
1. L.	8 1 $5\frac{1}{2}$
2.	2 19 $4\frac{1}{2}$
3.	21 3 $1\frac{1}{4}$
4.	0 7 $5\frac{1}{4}$
5.	8 11 1
6.	9 1 $3\frac{1}{2}$

§ 120.

1. L.	469 7 4
2.	218 4 8

§ 121.

Quest.	
1. L.	99 0 $5\frac{1}{2}$
2.	449 10 3
3.	66 13 4

§ 122.

1.	$6\frac{1}{2}$ years
2.	4 per cent.

§ 123.

1.	74 days
2.	$64\frac{1}{10}$ days

MISCELLANEOUS QUESTIONS. § 124.

I. Gain	-	L. 2378 10 0
II. Price per boll		0 15 0
III. Gain	-	3 6 3
IV. Loss	-	12 19 $10\frac{1}{2}$
V. Price per yard		0 2 3
VI. Gain	-	25 18 0
VII. Sea-car. cheaper		3 2 6
or per load		0 0 5

VIII.

1st,	231	at	2s. 4d.
2d,	96	—	2s. 4d.
	$157\frac{1}{2}$	—	2s.
3d,	$269\frac{1}{2}$	—	2s.
	23	—	2s.
4th,	314	—	1s. 6d.
	22	—	1s.
5th,	539	—	1s.

INTRODUCTION TO MERCHANDIZE.

9

MISCELLANEOUS QUESTIONS.

§ 124.

Quest.			
IX.	For work,	L. 3 11 2	
X.	Gain,	- 1 16 5	
XI.	Payment,	- 9 7½	
XII.	Price per barrel,	- 2 3	
XIII.	3330 yards		
XIV.	Imported wheat,	B. 7800	
	Pease,	- 9070	
	Oats,	- 12341	
	Exported barley,	22888	
XV.	Amount,	L. 14940 13 4	
XVI.	Time in gs. 3 years 79 days		
	in sb. 67 yrs. 211 days		
	Waggons, guineas,	2631—	
	sbillings,	39827—	
	Extent in wag. gs. M. 20—		
	sb. 301+		
	Ext. in a line, gs. 2224+		
	sb. 46717+		
	Ground, guineas, A. 22+		
	sbillings,	472—	
XVII.	9 per cent.		
XVIII.	Water, $\frac{1}{11874}$		
	Air, $\frac{1}{84}$		
XIX.	Gain by accept. L. 2 5 —		
XX.	Price per boll, 1 — 6		
XXI.	Price per yard, — 1 6½		
XXII.	Loss, L. 10 5—		
XXIII.	Captain, 1442 16 3		
	Com. off. each, 96 3 9		
	Warant officers, 53 8 9		
	Petty officers, 25 6 3		
	Privates, 6 8 3		

MISCELLANEOUS QUESTIONS.

§ 124.

Quest.			
XXIV.	Loss by keeping, 1 1 4½		
XXV.	Crop per acre, 17½ ft.		
	per hd. 26½ ft.		
	Seed per acre, ½ hd.		
	Pr. seed, per hd. 2 16 8		
	per ac. 1 17 9½		
	per yr. 2 16 4½		
	Pr. flax, per st. — 4 11		
XXVI.	Gain, — 15 19 10½		
XXVII.	Price, — — 4 5½		
XXVIII.	Value of punch, 562800		
	Tonnage, 5740		
XXIX.	Horses, — 740741—		
	Iron, — 8888892		
	Smiths, — 1482		
	Ships, — 40—		
	Mariners, — 200		
XXX.	Cattle, — 54		
XXXI.	2113 ac. 1 r. 25 p. 2 y. 5 f.		
XXXII.	Hay, L. 44 14 —		
	Oxen, — 53 — —		
	Cows, — 44 16 —		
	Horses, 41 13 4		
XXXIII.	Amount, 588 12 —		
XXXIV.	1 r. 4 p. 2 y. 3 f.		
XXXV.	Velocity per hour		
	Miles.		
	Light, 1016069372+		
	Earth in orbit, 84924+		
	on axis, 1041+		
	A stone, — 21+		
	Sound, — 784+		
	Cannon-ball. 420		
	A horse, — 20		
	Hour-band, $\frac{1}{1180}$		
XXXVI.	Acres, 636475		

B

VULGAR

VULGAR FRACTIONS. VULGAR FRACTIONS. VULGAR FRACTIONS.

§ 128.

Quest.	
1.	$\frac{3383}{8}$
2.	$\frac{2628}{7}$
3.	$\frac{7068}{11}$
4.	$\frac{1863}{4}$
5.	$\frac{60002}{365}$
6.	$\frac{3838}{17}$
7.	$\frac{91023}{194}$
8.	$\frac{2353}{11}$
9.	$\frac{24636}{15}$
10.	$\frac{78828}{18}$
11.	$\frac{126917}{16}$
12.	$\frac{5400}{17}$
13.	$\frac{7438}{176}$
14.	$\frac{66011}{666}$

§ 130.

Quest.	
1.	$\frac{32418}{8}$
2.	$\frac{286}{15}$
3.	$\frac{27917}{17}$
4.	$\frac{4820}{128}$
5.	$\frac{2415}{15}$
6.	$\frac{2119}{35}$
7.	$\frac{9286}{91}$
8.	$\frac{2022}{118}$

§ 133.

120, 105, 83,

Quest.	
1.	$\frac{3}{35}$
2.	$\frac{7}{9}$
3.	$\frac{15}{14}$
4.	$\frac{33}{15}$
5.	$\frac{21}{11}$
6.	$\frac{17}{10}$
7.	$\frac{23}{10}$
8.	$\frac{17}{11}$
9.	$\frac{67}{109}$
10.	$\frac{271}{229}$
11.	$\frac{23}{8}$
12.	$\frac{33}{17}$
13.	$\frac{183}{617}$
14.	$\frac{3}{101}$
15.	$\frac{19}{26}$

§ 133.

Quest.	
16.	$\frac{3}{106}$
17.	$\frac{5}{11}$
18.	$\frac{103}{107}$

§ 138.

Quest.	
1.	$\frac{110}{10}$
2.	$\frac{1104}{185}$
3.	$\frac{21}{11}$
4.	$\frac{151}{100}$
5.	$\frac{15219}{180}$
6.	$\frac{13288550351}{174110846}$
7.	$\frac{41}{61}$
8.	$\frac{1121}{113}$
9.	$\frac{21154}{1403}$
10.	$\frac{19}{10}$
11.	$\frac{177}{18}$
12.	$\frac{12784381}{111345}$

§ 140.

Quest.	
1.	$\frac{3}{14}$
2.	$\frac{4}{15}$
3.	$\frac{13}{10}$
4.	$\frac{2}{99}$
5.	$\frac{113}{11}$
6.	$\frac{828}{11}$
7.	$\frac{2}{9}$
8.	$\frac{7}{33}$
9.	$\frac{62}{113}$
10.	$\frac{2233}{18080}$
11.	$\frac{467}{3848}$
12.	$\frac{134}{137}$

§ 143.

Quest.	
1.	$\frac{4}{63}$
2.	$\frac{7}{15}$
3.	$\frac{34}{99}$
4.	$\frac{73}{1745}$
5.	$\frac{5521}{11}$
6.	$\frac{269384}{11}$
7.	$\frac{230153}{111}$

§ 143.

Quest.	
8.	$\frac{146543}{18}$
9.	$\frac{15}{18}$
10.	$\frac{5}{9}$
11.	$\frac{35}{101}$
12.	$\frac{2259}{11}$
13.	$\frac{29771}{11}$
14.	$\frac{457723}{11}$
15.	$\frac{5125}{118}$
16.	$\frac{1710}{11}$

§ 146.

Quest.	
1.	$\frac{31}{23}$
2.	$\frac{15}{10}$
3.	$\frac{147}{143}$
4.	$\frac{11}{11}$
5.	$\frac{13}{85}$
6.	$\frac{2101}{11}$
7.	$\frac{1068}{79}$
8.	$\frac{12691}{156}$
9.	$\frac{22}{27}$
10.	$\frac{255}{106}$
11.	$\frac{1407}{110}$
12.	$\frac{3}{118}$
13.	$\frac{23}{11}$
14.	$\frac{7405}{8}$
15.	$\frac{9971}{11}$
16.	$\frac{271}{74}$

§ 147.

Quest.	
1.	$\frac{173}{110}$
2.	$\frac{7}{11}$
3.	$\frac{11}{106}$
4.	$\frac{13}{10}$
5.	$\frac{11}{143}$
6.	$\frac{1}{46080}$
7.	$\frac{401}{480}$
8.	$\frac{101}{140}$
9.	$\frac{69}{1140}$
10.	$\frac{1}{111}$
11.	$\frac{1}{11}$
12.	$\frac{1}{2800}$

VULGAR FRACTIONS. DECIMAL FRACTIONS. DECIMAL FRACTIONS.

§ 148.

Quest.

1. 2s. 10 d. $1\frac{1}{4}$ f.
2. 3 lb. 9 oz. $12\frac{2}{3}$ dr.
3. 8 f. $15\frac{1}{3}$ ell
4. 4 oz. 12 dwt. $7\frac{5}{13}$ gr.
5. 1 f. 8 p.
6. 8 cwt. 3 q. $15\frac{5}{8}$ lb.
7. 1 q. $\frac{4}{11}$ n.
8. $\frac{48}{121}$ f.
9. 2s. 2 d. $2\frac{2}{3}$ f.
10. 9s. 7 d. $2\frac{6}{7}$ f.
11. 21 lb.
12. 10 lb. 10 oz. $14\frac{6}{11}$ dr.
13. $12\frac{1}{2}$ poles
14. 2 r. 36 f. $13\frac{1}{11}$ e.
15. 10 dwt. 16 gr.
16. $3\frac{1}{8}$ pts.

Quest.

1. $\frac{11}{80}$
2. 7 a. 3 r. 38 f. $31\frac{1}{11}$ e.
3. 2 lb. 7 oz. 5 dt. 20 g.
4. $7\frac{1}{10}$ lb.
5. 7 f.
6. L. 3 11 3
7. 9 6 $5\frac{7}{8}$
8. 1 15 $10\frac{4}{11}$
9. Share, 15 12 3
10. 1 a. 1 r. $\frac{40}{121}$ p.
11. L. 3 12 11
12. 1 11 $8\frac{8}{11}$
13. $\frac{1}{4}$
14. 14 cwt. 1 q. $20\frac{1}{10}$ lb.
15. 1 r. 21 f. 6 e.
16. L. 6 11 4
17. * 40 8 6
18. $7\frac{11}{10}$ feet.
19. $419\frac{2}{3}$ lb.
20. 3 s. 9 d.
21. $10\frac{1}{2}$ yds.
22. 16 s. 4 d.
23. † L. 42 : 4 : $6\frac{6}{7}$
24. 36 : 2 : $2\frac{2}{3}$

* Read $\frac{11}{10}$ † Read L. $1\frac{1}{2}$

B 2

§ 153.

Quest.

1. .6
2. .152
3. .375
4. .96875
5. .444
6. .466
7. .265625
8. .81,
9. .592,
10. .10,714285,
11. .1,36,
12. .04
13. 4.16
14. 149.04
15. 504.22
16. 42.5
17. .48
18. .0208
19. .7265625
20. .888
21. .416
22. .36,
23. .013
24. .32,142857,
25. .0,12345679
26. .042857,
27. .9,285714,
28. .35416
29. 30.5
30. 1.6
31. 5.5
32. 33.18,

§ 155.

Quest.

1. .2125
2. .446875
3. .5625
4. .378125
5. .2875
6. .03125
7. .375
8. .416
9. † .40625

† Read 8 dr.

§ 155.

Quest.

10. .5125
 11. .0625
 12. .7
- § 156.
- Quest.
1. 17s. 6 d.
 2. 1 oz. 16 dwt. 18 gr.
 3. 16 dwt. 12 gr.
 4. 6 bolls
 5. 2 c. 1 q.
 6. 5 f. 25 p.
 7. 7 s. $3\frac{1}{2}$ d.
 8. 3 f.
 9. 14 c. 3 q. $24\frac{108}{121}$ lb.
 10. 3 oz. 4 dr.
 11. 15 dwt.
 12. 1 q. 3 n.

§ 158.

Quest.

1. 62483.20918
2. 5768.9316
3. .0785
4. 10.91
5. 5.398
6. 2.3333
7. 7.6185
8. L. 17.04375
9. C. 46.625
10. Ch. 36.515625
11. 1.133125
12. L. 24.496875
13. Ac. 39.49375
14. lb. 16.1640625
15. 1.11625

§ 159.

Quest.

1. 103.1934
2. .042256
3. .26928
4. .09
5. 2.93924

DECIMAL

SUPPLEMENT TO HAMILTON'S

DECIMAL FRACTIONS. DECIMAL FRACTIONS. DECIMAL FRACTIONS.

Quest. \$159.

6. .322
7. .8
8. 1.188

Quest.

1. L. 11.1015625
2. 274.321875
3. lb. 3.33359375
4. L. 14.2796875
5. 19.06875
6. 12.65625

\$160.

Quest.

1. 16.
2. 173000.
3. .0232875
4. 38.59
5. 324.
6. 12600.
7. 310.2

\$161.

Quest.

1. L. .175
2. 18.74375
3. Ac. .9875
4. L. .6625
5. * .25

\$164.

Quest.

1. L. 2.3625
2. 3.2333
3. 3.3083
4. 1.27083
5. .56875
6. .9885416
7. .884375
8. .815625

* Read $8\frac{1}{4}$ yds.

\$166.

Quest.

- | | s. | d. | f. |
|-----|----|----|----|
| 1. | 7 | 6 | — |
| 2. | 7 | 4 | 3 |
| 3. | 8 | 8 | 2 |
| 4. | 9 | 10 | 1 |
| 5. | 13 | 6 | 2 |
| 6. | 19 | 10 | 1 |
| 7. | 7 | — | 2 |
| 8. | 7 | 16 | — |
| 9. | 9 | 8 | — |
| 10. | 10 | 6 | 3 |
| 11. | 11 | 10 | 2 |
| 12. | 7 | 5 | 3 |

Interminate Decimals.

\$171.

Quest.

1. $\frac{34}{99}$
2. $\frac{825}{900}$
3. $\frac{33}{90}$
4. $\frac{244}{900}$
5. $\frac{111}{900}$
6. $\frac{145}{900}$
7. $\frac{144}{900}$
8. $\frac{145}{900}$
9. $\frac{3107}{9000}$
10. $\frac{3449}{9000}$
11. $\frac{3418}{9000}$
12. $\frac{3452}{9000}$
13. $\frac{78}{999}$
14. $\frac{78}{999}$
15. $\frac{71}{999}$
16. $\frac{773}{9999}$
17. $\frac{11171}{90000}$
18. $\frac{14634}{99999}$
19. $\frac{14488}{99999}$
20. $\frac{14620}{99999}$

\$173.

Quest.

1. 1.4208
2. 1.78257
3. .6183

\$174.

Quest.

1. .110258
2. .0493
3. .114

\$175.

Quest.

1. 2.2,959768041
3088567170
10798551813,
2. .336,9573515
91014,
3. 2.2,055796,
4. 2.581,64,
5. 2.301,536
6. .5257,4354657 }
68799102132 }

\$176.

Quest.

1. .145782,
2. .2611156,
3. .087542,
4. .215036,
5. .34,615,
6. .101,190476,

\$177.

Quest.

1. .3567
2. .322426
3. .216093
4. .045262
5. .27213
6. .2120675

\$178.

Quest.

1. .52,624,
2. .32,14,
3. .26,276,
4. 2.3,0087
5. .465,93,
6. .106,702,

DECIMAL

DECIMAL FRACTIONS. DECIMAL FRACTIONS. DECIMAL FRACTIONS.

§ 182.

Quest.

1. .281
2. .5840 β
3. .4253
4. .10024
5. .214,15,
6. .0808
7. .284,592,
8. .172,558922
9. .203,63,
10. .42,090,
11. .119548,
12. *.1

* Read 63,

§ 182.

Quest.

13. .03305781239 }
6694214876, }
14. .09,
15. .000102 &c. to }
198 places. }

Quest. § 185.

1. .168 β
2. 1.8,703,
3. 6.370,
4. .437710,
5. 2.402,
6. 7.714285,

§ 185.

Quest.

7. .5625
8. 7.2
9. .486
10. .567863
11. 2.930,
12. 3.09,
13. 1.763 β
14. 1.47571875
15. .6545
16. 1.12,587,
17. 1.625
18. †.75,900,

† Read 16,

DECIMAL FRACTIONS.

§ 182.

Quest.

- | | | | |
|----|--------------------|---|----------------------|
| 1. | L.105.7291 β | = | L.105 14 7 |
| 2. | 7.759375 | = | 7 15 $2\frac{3}{4}$ |
| 3. | 20.453125 | = | 20 9 $-\frac{3}{4}$ |
| 4. | 19. | | |
| 5. | 7.54375 | = | 7 10 $10\frac{1}{2}$ |
| 6. | 0.8972 | = | — 1 $9\frac{8}{15}$ |
| 7. | 2.07 | = | 2 1 $6\frac{2}{3}$ |
| 8. | .48125 | = | — 9 $7\frac{1}{2}$ |

§ 185.

Quest.

- | | | | |
|----|-------------------|---|------------------------------------|
| 1. | 85.5 | = | 85 yds. 2 q. |
| 2. | .3625 | = | 7 s. 3 d. |
| 3. | .8,03 | = | 9 oz. 12 dwt. $17\frac{5}{11}$ gr. |
| 4. | * 1.55803,571428, | = | 1 C. 2 q. $6\frac{1}{2}$ lb. |
| 5. | 31.25 | = | 31 lb. 4 oz. |
| 6. | .14583 | = | 2 s. 11 d. |
| 7. | .61875 | = | 12 s. $4\frac{1}{2}$ d. |
| 8. | † .8 | = | 16 s. |

* Read 2 gr. $15\frac{1}{8}$ lb.† Read L.5 5 $3\frac{1}{4}$

PART II.

ALGEBRA.

NOTATION.

§ 9.

Quest.

1.	46	9.	$8\frac{7}{9}$
2.	237	10.	$2\frac{1}{14}$
3.	3242	11.	36
4.	1656	12.	13
5.	2700	13.	602
6.	605	14.	18426
7.	387	15.	$5\frac{2}{3}$
8.	$22\frac{2}{9}$	16.	10

ADDITION.

§ 10.

Quest.

I.	4.	$4a - 10b$
II.	4.	$4a^2 - 9a$
III.	4.	$aa - a + 3b - 2c$
Mixed.	1.	$16a + 2b$
	2.	$6a + 2b - 6c$
	3.	$aa - 3a - \sqrt{a}$
	4.	$14ad - 2ab - 5ac$

SUBTRACTION.

§ 11.

Quest.

5.	$4ab - 3ac - bc$
6.	$-14a - b - 6c$
7.	$a - 3b + c$
8.	$-2a - 8c$

MULTIPLICATION.

§ 19.

Quest.

1.	$15a^2d - 21abd + 12acd$
2.	$15a^2b9 - 25acd9 + 25abef9 \}$ $- 35ag^2h$
3.	$7ab^2c + 63b^2c^2 + 49b^2c^2d - 7ac$
4.	$3a^3 - 3b^3$
5.	$x^4 + x^2y^2 + y^4$
6.	$9x^2 - 16y^2 - 40yz - 25z^2$
7.	$\frac{a^2 - ab - ac + bc}{b^2 - bc}$
8.	$a^2b^3 + ab^3 + b^3\sqrt{a} + a^2b + ab \}$ $+ b\sqrt{a} + a^2\sqrt{a} + a\sqrt{a} + a \}$

DIVISION.

§ 26.

Quest.

1.	$\frac{b}{3c}$
2.	$\frac{3ac}{b}$
3.	$\frac{3a}{2d} + \frac{2b}{d} + \frac{b^3}{2ad}$
4.	$-\frac{x^3}{bc} + \frac{x}{ac} + \frac{1}{ab}$
5.	$\frac{1}{2c} - \frac{c}{2a^3} + \frac{3c}{2b^3}$
6.	$2a + 3b^3$
7.	$a^3 + a^2b + ab^3 + b^3$
8.	$1 + \frac{2b}{a} + \frac{2b^3}{a^2} \&c.$

EVOLUTION.

§ 43.

Quest.	
1. 72	15. 1234
2. 325	16. 824
3. 234	17. 12 rem. 27
4. 1234	18. 111
5. 5001	19. 21
6. 536	20. 31
7. 429	21. 16.5
8. 1934.67 &c.	22. .6
9. 81	23. .125
10. 72	24. $\frac{9}{11}$
11. 94	25. .22
12. 365	26. .26—
13. 301	27. .3
14. 888	28. $\frac{11}{13}$

EQUATIONS.

§ 46.

Quest.			
1. $x = 48$	7. $x = 18\frac{3}{4}$		
2. — 105	8. — 9		
3. — 26	9. — 4		
4. — 20	10. — 10		
5. — 36	11. — 3		
6. — 14	12. — 4		

§ 55.

Quest.	
1. 12 youngest	
2. L. 2400	
3. L. 600 to each younger son	
4. 1181 at Edinburgh	
5. 168 by A.	
6. 20 horses	
8. 15 days	
9. 40s.	
10. 360 eggs	
11. L. 1110	
11. 4 hours, 48 min.	
12. 24 days	
13. 20 hours	
14. 10 hours	
15. A. 30. B. 20. C. 60 hours	

EQUATIONS.

§ 55.

Quest.	
16.	18 persons.
17.	40 feet, side of square
18.	79 and 6320
¶ 19.	45 : 18
20.	35 : 49
21.	20 : 11
22.	17 : 9
23.	63 : 75
24.	20 : 16
25.	30 : 6
26.	23 : 18
27.	10 : 15
28.	12 : 15
29.	216 : 288
30.	25 : 25 lb.
31.	114 : 56 ounces
32.	90 : 80 inches
33.	50 : 30
34.	L. 38 : 8 and L. 28 : 16
35.	50 : 150
36.	180 : 240
37.	35 : 15
38.	100 : 140
¶ 39.	18 : 20 : 25
40.	23 : 20 : 1
41.	$8\frac{1}{3} : 11\frac{1}{3} : 40\frac{1}{3}$
42.	12 : 8 : 5
43.	6 : 7 : 11 : 12
¶ 44.	1 : 2 : 3, &c. to 35 at 42d. }
	70 : 68 : 66, &c. to 2 at 48d. }
45.	5 : 10 : 15, to 95 guineas }
	379 : 358 : 336, to 1 crown }
	19 ways
¶ 46.	30 : 24
47.	24 : 16
48.	11 : 8
49.	7 : 5
50.	16 : 14
51.	9 : 7
52.	12 : 9
53.	8 or 2
54.	28 : 16
55.	150 : 100

ARITHMETICAL PROGRESSION.

Quest.	§ 74.
1.	78
2.	L. 300
3.	$n = 16$ end of 15 years
4.	10100 yards
5.	L. 1115.
6.	20 : 320
7.	8 : 188
8.	13 : 25

GEOMETRICAL PROGRESSION.

Quest.	§ 78.
1.	13841287201 grains. 19773 bushels
2.	18446744073709551615 gr. 2735249153387 B.
3.	201326592 persons.
4.	1018 original settlers
5.	L. 10235 and 11 games
6.	46656 persons

COMPOUND INTEREST.

Quest.	§ 84.
1.	L. 1480.24
2.	1019.8
3.	17.086 years 17 yrs. 32 days
4.	4.729 per cent.
5.	L. 379.959

ANNUITIES.

Quest.	§ 87.
1.	L. 2157.82
2.	46.343
3.	14.207 years 14 yrs. 75 days
4.	L. 1359.03

ANNUITIES.

Quest.	§ 87.
5.	64.398
6.	173.443
7.	848.24

SERIES.

	§ 98
1.	2925
2.	5525
3.	* 2170
4.	5078
5.	3025
6.	66
7.	59005
8.	255
9.	479001600
10.	27720
11.	208
12.	624

* Read of 14 tires.

CHANCES.

Quest.	§ 107.
1.	729, 2916, 4860, 4320, } 2160, 576, 64 den. 15625 }
2.	6.579
3.	$\frac{125}{1296}$
4.	$\frac{456}{48638} = \frac{19}{1244}$

§ 135.

Computed according to De Moivre's Hypothesis and Halley's Table of Probabilities.

Quest.	
1.	L. 8.69 at 3 per cent.
2.	8.57 at 4 per cent.
3.	34.96 ditto
4.	27.1 if payments for life. 20.7 if during marriage.
5.	32.4 — life 24.7 — marriage

PART III.

BILLS OF EXCHANGE, &c.

WEIGHTS and MEASURES.

§ 24.

Quest.

1. 16183 pints
2. A. 1583 3 34 $21\frac{1}{2}$
1601+ diff. feet
3. lb. 391 10 14
4. 365 10 8
5. $249\frac{1}{2}\frac{1}{7}$ lb.
6. L. 2092 2 15
7. 63881 16 $8\frac{1}{2}$

HOLLAND.

§ 29.

Quest.

1. f. 1215 18
2. L. 161 6 7
3. 161 9 10
4. 114 4 $4\frac{1}{2}$
5. f. 4627 $10\frac{1}{2}$
6. 1537 $19\frac{1}{2}$
7. 34s. $2\frac{1}{9}$ d.
8. 21.077 d.
9. Gain, L. 3 5 1
10. Gain, 8 19 $9\frac{1}{4}$

GERMANY.

§ 30.

Quest.

1. L. 115 7 7
2. M. 26975 7 lubs
3. 33 s. $10\frac{1}{4}$ d.
4. M. 1001 14 lubs
5. f. 1211 6 14
6. L. 216 18 10
nearly 3 s. 6 d. p. R. D.

C

GERMANY.

§ 30.

Quest.

7. R. 7820 2
8. L. 219 13 9 *directly*
219 6 2 *by Amst.*
209 14 3 *by Hamb.*

DENMARK.

§ 31.

1. L. 1118 8 $8\frac{1}{2}$
2. 1082 5 4
3. R. 427 1 —
4. 410 3 1

SWEDEN:

§ 32.

Quest.

1. L. 804
2. f. 8821 13
3. C. D. 48600
4. 3900
5. nearly $5\frac{1}{4}$ d. p. cop. dol.

POLAND.

§ 33.

Quest.

1. M. 1090 7
2. f. 871 1
3. f. 12234 26
4. L. 418 — 8 *by Holland*
1 s. $\frac{1}{4}$ d. *nearly*
L. 443 1 4 *by Hamb.*
1 s. $1\frac{1}{2}$ d. *nearly*

LIVO-

LIVONIA.

§ 34.

Quest.

1. L. 619 — $1\frac{1}{2}$
2. R. 514 50
3. $60\frac{1}{8}$ d. nearly
4. L. 346 6 $11\frac{1}{4}$ by Holl.
32 — $11\frac{1}{4}$ by Hamb.

RUSSIA.

§ 35.

Quest.

1. L. 389 4 $9\frac{1}{2}$
2. 395 7 $5\frac{1}{2}$
3. 373 3 2
4. R. 706 93

FRANCE.

§ 36.

Quest.

1. L. 43 14 4
2. Lrs. 124697 8
3. f. 474 7
4. Lrs. 1811 6

PORTUGAL.

§ 37.

Quest.

1. M. 460 588
2. Lrs. 963 4
3. f. 24923 5
4. Gain, L. 12

SPAIN.

§ 38.

Quest.

1. L. 42 18 1
2. R. 120174 32
3. f. 956 17
4. Lrs. 2158 16 10
5. M. 308 927
6. R. 6838 8
7. L. 125

ITALY.

§ 46.

Quest.

1. L. 133 — 6
2. 14 14 6
3. 230 15 —
4. 76 5 $4\frac{1}{2}$
5. 61 6 $9\frac{1}{4}$
6. O. 788 6 6
7. Lrs. 91540 1 7
8. f. 2898
9. M. 523 4
10. Lrs. 3971 17
11. R. 9496 11
12. Lrs. 1732 1
13. M. 1132 490
14. R. 2563 8
15. Lrs. 750 13 11
16. D. 332 — 15
17. Lrs. 6542 4
18. D. 1746 3
19. Lrs. 1569 10
20. Cr. 1032 $9\frac{6}{10}$

IRELAND, &c.

§ 49.

Quest.

1. L. 1382 19 9
2. 380 10 $\frac{1}{4}$
3. 502 18 $9\frac{1}{4}$
4. 1612
5. Gain 60 8 $6\frac{1}{4}$

§ 58.

Quest.

- II. Drawn by Holl. L. 1950 16 10
directly, 1935 18 5
Oats per B. 15s. 1d. nearly
Wheat, 15s. $9\frac{1}{2}$ d. nearly
- III. T. 11 8 2 — 8 265 6 3
Per C. L. 1 3 $2\frac{1}{4}\frac{1}{4}$
- IV. Drawn on London, 121 15 6
on Holland, 126 14 10
 $31\frac{1}{4}$ cwt. at L. 3 16 8
- V.

INTRODUCTION TO MERCHANDIZE.

19

MISCELLANEOUS QUESTIONS.

Quest.	§ 58.
V.	L. 1 2 $6\frac{1}{4}$
VI. Loss by remitting,	3 14 6
Gain by impt. wine,	15 1 18 6
VII. Gain ———	160 10 $5\frac{1}{4}$
VIII. Gain by bills,	36 15 $10\frac{1}{2}$
by sugar	7 1 3 7
IX. Gain by sales at Rot.	4 1 3 8
at Dunkirk,	104 1 10
X. Gain in Britain,	37 15 —
in France,	17 1 6
in Holland,	26 6 8
Loss in Portugal,	2 17 8

BILLS OF PARCELS.

Quest.	§ 61.
I.	L. 223 19 1
II.	50 6 5
III.	125 18 1
IV.	287 — $5\frac{3}{4}$
V.	14 5 $11\frac{1}{4}$

INVOICES.

Quest.	§ 62.
I.	L. 108 17 $9\frac{1}{7}$

INVOICES.

Quest.	§ 61.
II.	L. 91 18 3
	34 8 4
	20 10 —
	89 17 9
	40 10 —
	28 2 —
	20 5 —
	28 15 10
	L. 354 7 2
III.	f. 2853 14 —
IV.	L. 253 17 $6\frac{1}{2}$
V.	R. 252725 15

ACCOMPTS SALES.

	§ 64.
I.	L. 608 14 $-\frac{1}{2}$
II.	110 3 $10\frac{3}{4}$
III.	384 13 $-\frac{1}{4}$
	§ 67.
Repairs,	L. 18 — $11\frac{1}{4}$
Victualling,	32 2 11
Wages,	15 18 —
Port charges,	1 10 3
	L. 67 12 $1\frac{1}{2}$

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